Precision SHOOTING

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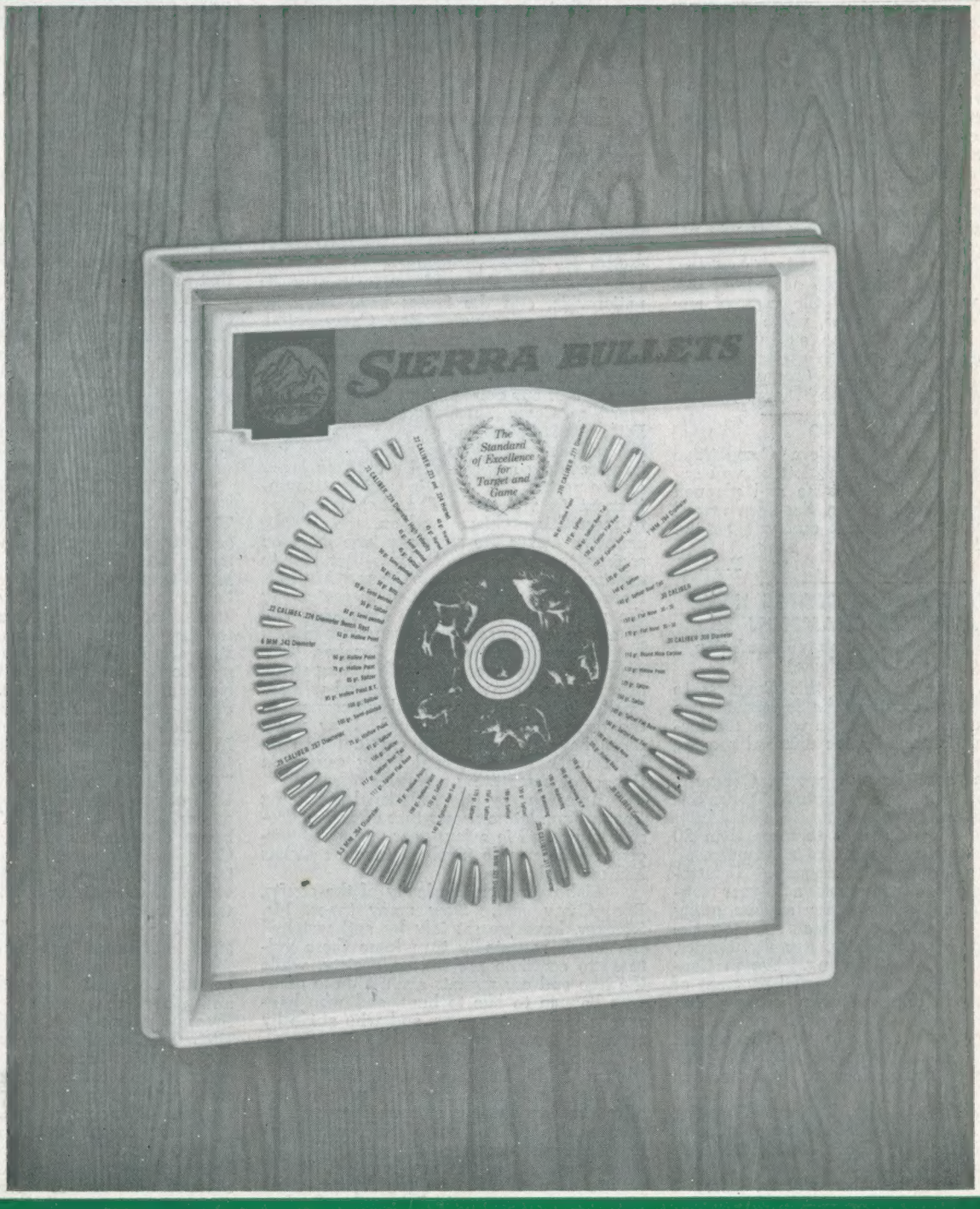

a magazine for Shooters by Shooters

Precision SHOOTING

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Editor—P. H. Teachout
President—Creighton Audette
Vice-President—Dermot Reilly
Treasurer—P. H. Teachout
Clerk—Frederick G. Mehlman

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COVER PHOTO

The new, attractive display board of all bullets manufactured by SIERRA BULLETS, INC. The display is pleasingly arranged within a 16 X 16 inch portrait type frame made of lightweight, durable plastic. Each of the 54 actual bullets are identified for caliber, style and weight.

Each bullet is mounted in a fitted depression and fastened with a special adhesive compound. The acetate cover is printed on the inside to prevent defacing. It will not fade and is easily cleaned.

While the attractive display is primarily intended for dealer wall or counter display, it would ornament the wall of any shooter's den or gun room, while providing a ready reference to the entire SIERRA bullet line. The display is available to individuals at $8.50 retail. (Regular jobber and dealer discounts to the "Trade.")

CANCELED

The History of Modern Competitive Bench Rest Shooting, Part I, that was announced in the March issue and planned for the Bench Rest section, has been vetoed by the NBRSA President and will not be published.

P. H. T.

HUNTERS AND SHOOTERS HAVE ANOTHER CHAMPION

(A National Shooting Sports Foundation, Inc. news release)

"Mr. Speaker, I ask this Congress to stop the harassment of the legitimate gun owner—and instead to open war on the illegal use of firearms by the criminal preying on society."

With these dramatic words, Congressman Robert Casey of Houston, Texas, this week introduced two bills in the House which are welcome news to more than 20 million hunters and shooters in America.

Rep. Casey told Congress, "I introduced legislation today to set a 25-year mandatory Federal sentence for anyone guilty of using or carrying a firearm during the commission of a robbery, assault, murder, rape, burglary, or kidnaping. We in Congress can swiftly enact a model program of crime control for our own crime-ridden home base of the District of Columbia, and one bill pertains solely to it. The second invokes the authority of the interstate commerce clause and pertains to the Nation as a whole."

According to the National Shooting Sports Foundation, the shooting industry and sportsmen have been asking for such legislation for decades.

Bills similar to those of Rep. Casey—aimed at criminal misuse of firearms with no harassment of law-abiding recreational shooters—have been entered in the California and Illinois Legislatures.

Charles Dickey, director of NSSF, predicts that the bills will pass. "The American public, especially in our metropolitan centers, is tired of being pushed around by criminals. Tough laws aimed at the criminal, with vigorous prosecution and mandatory sentences are needed to help our overworked police departments."

Rep. Casey told Congress, "The criminal, Mr. Speaker, is the cause of the problem facing our Nation today—not the sportsman, the gun collector, the decent law-abiding citizen who happens to own one or more guns. And it is this problem that we should attack.

"There are pending before Congress proposals calling for registration of all guns, and I tell my colleagues now that this is a completely ineffectual way to strike at the problem of illegal gun use. I see little need to further harass the legitimate gun owner when the porblem is caused by the criminal, most of whom are repeat offenders often using stolen weapons to commit a crime.

"Mr. Speaker, no man in his right mind can expect a criminal planning a robbery with a stolen gun to register the weapon with Federal authorities, or to be alarmed because he has not done so."

Rep. Casey further stated, "We, in Congress, are being asked to justify the need for such a sweeping proposal. We should know, before we pile unworkable and unnecessary restrictions on the decent citizen, the nature of the criminal causing the problem."

Rep. Casey said he realized the reluctance of Congress to invade the field generally left to the States to prosecute and punish for crimes of violence.

"But the problem of outlaw gun use is nationwide, and the States have failed to deal with it effectively," Rep. Casey stated. "The Federal Government sets mandatory sentences for trafficking in narcotics, and the illegal use of guns by criminals touches far more of our citizens than dope."

Rep. Casey told Congress, "Here in the District of Columbia, as over the Nation, the serious problem of illegal gun use has been severely aggravated by extreme laxity on the part of the courts in meting out punishment to violators. The time has come to meet this problem head on, and to take from the courts the power to turn loose on society the second and third offenders to continue preying on our citizens. My bills leave the courts no discretion in sentencing the guilty, and I think this legislation will go a long way in solving a growing problem.

"How many times, Mr. Speaker, have we read of the ex-convict with a long string of arrests and convictions for armed robbery finally killing an innocent businessman in the course of another crime? How many times have we read of a criminal free on bond while awaiting trial being caught in the act of committing a similar offense."

Research by the National Shooting Sports Foundation shows that of 168 policemen murdered in a four-year period 79 percent of the people involved in the murders had criminal records.

Elaborating on the laxity of the courts, Rep. Casey said, "How many times, Mr. Speaker, have we sat idly by and watched the courts repeatedly turn loose these vultures to continue preying on society, while the hue and cry mounts against those of us who happen to like to hunt, and who happen to like to own guns, and who abide by all of the laws of our society?"

Rep. Casey said that passage of his legislation, H. R. 5641 and H. R. 5642, ". . . will stop the hysterical cries to unduly penalize the law-abiding citizens through imposition of rigid and unworkable restrictions on sale, registration, or taxation of firearms, when the heart of the problem is to find a way to protect these same good citizens from the criminal in our midst."

"I have no quarrel," Rep. Casey stated, "with those who wish to place needed and workable restrictions on the easy availability of firearms to the mentally incompetent, the criminal, or the unsupervised teenager. I have no quarrel with those who wish to prohibit our Nation becoming the world's dumping ground for surplus arms that are generally worthless and, more often than not, extremely dangerous for the purchaser to use.

"But I shall vigorously oppose any effort to impose sweeping restrictions upon the law-abiding citizen, while this Congress and the respective States blandly ignore the cause of our Nation's most serious problem. I urge my colleagues to join with me in this effort."

(P. S. Editor's comment: From the reported comments of Congressman Casey it would appear that these bills—H. R. 5641 and H. R. 5642—are the type of sensible, effective and desirable firearms legislation. We **do** have a national problem of the MIS-USE of firearms by a minority. Congressman Casey's introduced bills in the U. S. Congress recognize the problem for what it is—the criminal or even irresponsible MIS-USE of firearms—and offer an enforceable, effective means for combating that problem.

I feel strongly that EVERY shooter should write to his U. S. Representative and U. S. Senators in support of this type of legislation and, at the same time, register continued opposition to gun registration or any legislation unreasonably harassing the law-abiding citizen. This is important. Be as "PRO" for good legislation as you "ANTI" for bad legislation.

P. H. T.)

STOP THE PRESS! (Mar. 19) MASTER SERGEANT BILL KRILLING ACHIEVED THE IMPOSSIBLE—A PERFECT 3200 POSSIBLE PRONE AT WINTER HAVEN (Florida). TEAM MATCHES GAVE HIM FERFECT 4000. ANOTHER VICTORY FOR USAMTU AND ANSCHUTZ.

(Telegram from Betty S. Duncan)

GIVE CREDIT WHERE DUE

On January 14th and 15th, California TV station KNXT broadcast an editorial suggesting the registration of guns. What makes this "NEWS" is that KNXT-TV allotted time on February 3rd and 5th for rebuttal to this editorial by Mr. Robert M. Modisette, Jr., of Pasadena, a member of the Legislative Committee of the California Rifle and Pistol Association and Director and member of the Executive Committee of the National Rifle Association. For this spirit of fair-play, KNXT-TV is to be commended.

Bob Modisette made a fine rebuttal. In so doing, he recognized the problem of MISUSE of firearms and made these points: "The solution to the problem of the MISUSE of firearms is the vigorous enforcement of legislation—ALREADY on the statute books (Section 12022 of the State Penal Code)—which provides for severe, mandatory and additional penalties to those convicted of committing a felony while armed with a firearm."

"The application of the MISUSE principle in firearms legislation does not interfere in any way with the rights guaranteed by our Constitution and the Bill of Rights and places the penalties for MISUSE of firearms where they rightly belong. MISUSE legislation in no way restricts the proper use of firearms by sportsmen, target shooters, and citizens generally, and therefore will be strongly supported by the large segment of our population."

Many of our states, in addition to California, do ALREADY have on their statute books which would provide adequate penalties for MISUSE of firearms—if they were observed and enforced—but these laws are too generally neglected, not enforced, and, probably, a majority of people are not aware that they ALREADY have such laws. In these many states, NEW laws are not needed. What is needed is ENFORCEMENT

of laws which are ALREADY on statute books.

A LATE NRA BULLETIN advises that similar bills pertaining to MISUSE of firearms in crime were introduced in the Illinois Senate and House of Representatives on February 23, 1965. Principal provisions of the bills are stated to be:

(a) The commission of a crime of violence **when armed** constitutes a separate and distinct offense. A crime of violence is defined as solicitation, homicide, kidnapping and related offenses, rape, deviate sexual assault, bodily harm, deceptive practices, robbery, mob action, resisting or obstructing a peace officer, obstructing service of process, and escape.

(b) An accused is considered armed when he carries on or about his person or has readily available any firearm or other type of weapon as defined.

(c) The **mandatory** penalty for the commission of a crime while armed, **in addition to the penalty for the crime itself,** (1) shall be imprisonment for a term of not less than two years and not more than five years for the first offense; (2) imprisonment for a term of not less than five years nor more than ten years for the second offense; and (3) imprisonment for life for the third offense.

(d) The sentences imposed under this bill shall run consecutively and not concurrently with any other sentence provided for the crime if committed unarmed.

(Editor's note: This is firearms legislation aimed at the right target. We can hope that this is the beginning of a trend.)

P. H. T.

inch split rings which fit any of the standard REDFIELD bases.

For the smallbore target competitor there is a new International Match Smallbore front sight which features an outer extension sleeve which eliminates possibility of light leakage when using plastic aperture inserts, and a new two-step base, allowing for quick forward-backward from 100-50 yards.

Send to the Redfield Gun Sight Co., 1315 South Clarkson St., Denver, Colorado 80210, for the 1965 catalog and get the dope on the entire REDFIELD line.

PRIMER ANNOUNCEMENTS

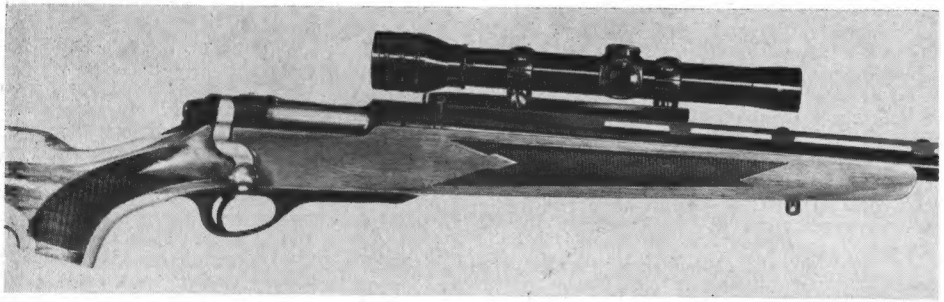
The Federal Cartridge Corporation, 2700 Foshay Tower, Minneapolis, Minn. 55402 announces the following changes in their center fire primers.

The primers will now be made with flat cups instead of the round cups, thus eliminating the need for special, rounded punches for most successful seating of some of their former primers.

The primers will now be made with 3-legged anvils instead of 2-legged.

Another change has been the establishment of a uniform color code system for the waterproofing that Federal puts over the primer mixture. This is to help give peace of mind to a handloader who might get his primers mixed. The color code is:

No. 100	Small Pistol .175 diam.	Red
No. 150	Large Pistol .210 diam.	Green
No. 200	Small Rifle .175 diam.	Green
No. 210	Large Rifle .210 diam.	Red
No. 215	Large Magnum Rifle .210	Purple



The new REDFIELD Front-IER (Intermediate Eye Relief) 2X scope on the Remington 600 Carbine.

NEW ITEMS FROM REDFIELD

The "Front-IER (Intermediate Eye Relief) 2X scope which mounts ahead of the receiver of the Rem. 600 Carbine, Win. 94 carbine and some of the Lee Enfield rifles, replaces the M-294 scope introduced last year for the 94 carbine. The scope has a full 30 ft. field of view at 100 yards, eye relief of 6 to 10 inches, and weighs 8.5 oz. (with mounts it would probably add less than a pound to weight of rifle). A new split ring mount with top base having a tapered male dovetail which slides into the female dovetail of the bottom base. Used on the Rem. 600 (as illustrated) the bottom base attaches with three screws into the rib lugs and one screw in the receiver. These holes are already on the rifle. The bottom base for the Win. 94 and Lee Enfields are attached to the barrels with three screws.

Slim ¾ inch tube scopes of relatively low power on the slim lightweight hunting rifles have always appealed to me more than the bulkier 1 inch tube scopes of higher power. To me, they have more eye-appeal, and they carry handier than the bulkier scopes. Now REDFIELD fills that bill with their entirely new "sport-STER" with ¾ inch tube, in 2¾X and 4X magnification, and carrying a moderate price tag.

The new scope is designed for use on high-power rifles but, as well, as provides a high quality scope for .22 rimfire sporter rifles. Two types of mounting are provided; ¾ inch split rings with bases for attaching to grooved top receivers (such as most modern .22 rimfire sporters have) and ¾ inch split rings which fit any of the standard REDFIELD bases.

The new primers may not be locally available until dealers and jobbers replenish their primer stocks, and some of the old type primers may be on dealers shelves for considerable time. However, Federal primers have long had a reputation for excellence, so one needn't be too disappointed over having to wait a bit for the newer types to become locally available.

Write for a copy of the complete Federal catalog which includes .22 rimfire and center fire rifle and pistol cartridges as well as shot shells and shot shell reloading components.

The ALCAN COMPANY, INCORPORATED, 3640 Seminary Road, Alton, Ill. 62004, which has long been a manufacturer and supplier of a very complete line of shot shell loading components, now announce their "MAX-FIRE" rifle and pistol primers (small and large sizes for both rifle and pistol).

The primers are non-mercuric, non-erosive and non-corrosive. They have been developed and produced with the reloader in mind. ALCAN states that "The ability of the MAX-FIRE mixture to uniformly ignite reduced as well as high volume powder charges is one of the most important features of the Alcan center fire primers." (I hope I may get some of these primers to test and report on and, since I like to shoot reduced loads in my rifles, this is one feature I would carefully check on.)

For now, write to the ALCAN COMPANY for more detailed information about their new rifle and pistol primers.

P. H. T.

THE BLUE TRAIL RANGE

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Modern Shooting Range Facilities
Open seven days a week and Holidays.
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April 25—Conn. Big Bore League #1 (club teams)
May 2—President's Spring Prone Champ. (Sr.-Jr. Registered)
May 16—Stewart Match (High Power Team & Ind.) Registered
May 16—Conn. Pistol League #1 (club teams)
May 22-23—NRA Regional Police Combat Match
Night Leagues—Smallbore Prone and Position, and Pistol
For programs write to: Conn. State R & R Ass'n, Box 2117, Glenbrook, Conn.

COMING MATCHES

(We will list place, date, type and title of match, name of sponsoring organization, name and address of contact person, at a nominal flat rate of $2.00 per insertion, prepaid with insertion order. Insertion orders must reach the Precision SHOOTING office, Lyndonville, Vt., 05851, at least 45 days before date of match for single insertion orders. For multiple insertions, 30 days additional must be allowed for each additional insertion desired.)

NORTH ATTLEBORO, MASS.: May 8 and 9; New England Outdoor Pistol Championship at Angle Tree Stone Rod and Gun Club, Inc. Obtain programs from Mrs. Pearl Burke, 6 Crescent Avenue, North Attleboro, Mass.

LIBERTYVILLE, ILLINOIS: June 20th; Annual Blackhawk Prone Smallbore Rifle Tournament. Blackhawk Rifle Club. Programs from Harry R. Tevis, 315 N. Merrill, Park Ridge, Ill. 60068.

Bull-Session Stuff

BB AND CB CAPS

Regarding the piece by Fred W. Hallberg and BB caps, I tested these a few years back and had a ball. At that time I used RWS BB caps, Alcan imported BB and CB caps and Eley CB caps. I found that the RWS were very powerful and accurate for their size but also that the Alcan CB and Eley CB caps were accurate but that the Alcan BB caps didn't shoot groups, but patterns. All of the accurate caps were deadly on mice and sparrows and for the latter varmints I preferred Alcan CB caps as they weren't as loud and didn't disturb the people next door.

Jim Horton
Trenton, Mo.

COMMENTS ON THE 22/250

By Doak Criss

Isn't it something that Remington has finally come out with a 22/.250 rifle and ammunition? That one has been my true love over the years. Wonder if the factory job will have a chamber whereby the necked down .250/3000 case neck will fit the chamber neck. My custom rifles have too large a chamber neck for the necked down .250/3000 case.

(Continued on Page Twelve)

"UNFAILING"

(The following is a translation by William R. Funk, Murrysville, Pa. from the November 1964 "Sporting Life of Russia," a magazine similar in general sports coverage to our "Sports Illustrated." Bill comments: "They quite frequently mention people in the shooting sports, more than, say, Gary Anderson is mentioned in "Sports Illustrated." That isn't to say that we should turn Communist, but it would be nice if some of our top shooters got the recognition that the Communists give theirs."

"Now, maybe we (someone) can start on an article about Behnay (USA), Dunlap, Eric Johnson or one of our other top gunsmiths for "Sports Illustrated," "This Week" or another popular magazine.)

Melbourne. The year is 1956. In a day the 16th Olympic Games would begin. The team of Soviet Shooters is gathered together in their last pre-olympic meeting. Addressing the group is the head coach. He is saying:

"Comrades, we have looked well to the training of the strongest foreign sportsmen. We will have to make a rearrangement. In shooting from the full-bore rifle for medals they will have to successfully contend with our two members—Vasily Borisov and Allan Erman. Where there are complications is with the small bore rifle. Here there is a very strong rival. We must put in the most reliable, the most resolute. I propose Bogdanov."

"I don't even have my rifles"—rising from his place was Anatoly—"only two full-bore rifles. Really, you know this!"

"Comrade armorer"—the coach addressed a man sitting nearby, "Can we find a way out of this?"

"It will be difficult"—objected someone—"After all, to the start remains less than 24 hours."

But the one they called the armorer, rose unhurriedly from his place, and said calmly, "Time is needed; we will think of something."

The craftsman had with him a spare rifle. True, it was in the hold of the motor ship "Georgia," 50 kilometers from the Olympic village. But to go there and get it was a matter of two or three hours.

A very great problem was before him. The rifle was found to be brand new, it didn't even have the factory grease removed from it. The weapons craftsman inspected it with unconcealed dismay—the stock wouldn't do for Bogdanov, the trigger mechanism was found to have a weak tension. Of course, all of these were usual troubles, comparatively easy to eliminate. And the time remaining was just enough.

Without hesitation the armorer took the entire mechanism apart, took the stock from Bogdanov's rifle and fitted it to the new smallbore barrel and action. Everything seemed to be in order. It remained only to testfire the gun. A man looked at his watch. It is 15 minutes to two at nite. Always something! To the range it was 35 kilometers. If you open fire in the village—you awaken and frighten everyone! It is really a desperate situation.

The smith put his head on his hands and thought to himself. Then his face suddenly brightened. He got up, hummed something with a bravura motif and went to . . . . the bathroom. He drew the curtains. The door was locked with a turn of the key in the lock. Opened the tap. And when the tub had filled to the brim, he made some ten shots into the water—as many as were required.

In the morning the boys got up as though nothing had happened. Only Anatoly Bogdanov asked, "The smell of something burning a little bit, right, lad?"

"You smelled something burning in your dreams," the armorer interrupted him. "There is the best rifle ever tested, now, quickly to the firing line."

After six hours the Soviet Sportsman, Muscovite Anatoly Bogdanov had won the gold medal of an Olympic Champion in the small-bore standards. He was victorious over such unquestionable world famous favorites as the Czech, Morinek; and the Swede, Sundberg.

It is difficult to share the feeling of victory. In such a moment you forget about everything. But Anatoly Bogdanov got up from the firing line, tired; and surprisingly, first of all, rushed to the master armorer and said to him, as a man, sparingly, "Thank you, friend."

* * * * * *

A beautiful September in Bucharest. Dazzling shines the sun, but now its rays do not burn one, instead they warm one. Gardens and parks are still completely bright green. In the windows of the grocery stores in bazaars—is the rainbow of the harvest: golden, in huge baskets of peaches, cast in amber of ripe grapes, red hills of tomatoes . . . . "Golden Fall" they say about this time in Rumania.

September of 1955 the Soviet shooters passed in Bucharest. They invited to it twice gold medal winners, having in this a special purpose. On the stay then in the capital of Roumania for the European Championship, the Soviet shooters, in personal test, won 30 gold medals. The story of one of these I have kept in my memory since that time.

Perhaps, not every one knows that in such contests, on a major tournament level, where contention for famous titles takes place, there is classification of competition. Those who appear in them successfully, have really received the highest title of mastery of the international shooting sport. Here at the start often and very willingly appear to try their luck are trainers, judges, coaches of teams, and even brand new competitors.

At this time onto the firing line went the armorer of the Soviet group. He was doing quite well, having already received two souvenir medals, lining up with his comrades, and was preparing to carry out the third exercise when onto the range ran a messenger from the head coach of our group.

"Trouble, old chap," said he calling to the armorer, "big trouble."

"What is it?" he anxiously asked, setting his rifle aside.

"Let's run, on the way I will tell you."

To the range, where in contention for the title of Champion of Europe in shooting from the small bore pistol were the best marksmen of the continent, it was about two kilometers. While covering this distance, the messenger of the coach had time to tell everything to his companion.

Three men from our team had already fired. They had fired rather well. There remained only the last man. If he showed only his average training results, the "boys" could establish a world record. And everyone waited—both competitors and spectators.

The last to go for us was Eugene Cherkasov. According to the rules, for five minutes to the beginning of record firing, sportsmen received permission for practice shots. Cherkasov aimed, pulled the trigger and, suddenly, one after the other, rang out five shots. The targets turned. To shoot from such an unreliable pistol was out of the question. To take another unknown sportsman—meant condemning him and the team to a downfall.

"Can you help?" asked the messenger of the man going beside him.

"I don't know, it will be necessary to take a look."

"Let us hurry in, the judges are beginning to get nervous."

The chief of them is saying, "We will give you five minutes for repairs."

Chekasov stood pale from alarm, but the armorer said to him, "Don't worry lad, everything will be OK!"

Not hurrying he took the pistol apart, yet literally in two minutes the fault was eliminated. He tested the weapon for operation and gave it to the sportsman with a cheerful smile:

"Well, lad, shoot with confidence, everything is fine. From such a pistol it is only for the best to shoot. Of this you can be sure—you will become a champion."

From this affair with the pistol came good fortune, from the confidence of the armorer passed along to the shooter—Eugene Cherkasov became Champion of Europe. And our team had 240 hits on the silhouette—2339 points. This was a new world record.

The shooting was finished. Cherkasov went to the craftsman and silently pressed his hand, he could not find the necessary words to thank him.

* * * * * *

All the way to Innsbruck Vladimir Melanin, most of all, took care of his rifle. And not only because without it he could do nothing on the route of the biathlon. Already an extremely dear price—much human work—had been paid for it.

He was used to his rifle, and according to his sincere statements, he would not be able to set out without it. It was sort of an affectionate thing, close, spiritual in essence.

But misfortune had befallen from the very beginning of the Olympic year. In Zlatoust, on one of the tight turns at high speed, Vladimir fell down. From the heavy fall, the rifle tore loose from his shoulder, and crashed to the frozen ground, lodging a piece of icy dirt into the bore. On the firing line he endeavored to throw it out, but could not. He had to shoot it as it was. The force of gas in the bore blew it out beyond recognition. As a result—targets without bullet holes and 21st place! But this wasn't the worry, but the question: whatever will be next to do?

Quickly to Zlatoust from Moscow was called out the armorer. He brought with him a new rifle; and the previous damaged one, without which Melanin, according to his personal expression, couldn't live, was shipped in to the factory.

The new rifle was not pleasing to the heart of the world champion. Out of disappointment, he made misses that he had never made before, and he was even more sad for his "competition friend."

Finally, the previous rifle was sent to Zlatoust, Volodya (Short for Vladimir) was happy, but his joy turned out to be premature; at the factory they had overdone it—replacing on the "little old lady" literally everything. Five hours in succession the armorer spent tuning the rifle to its former way, returning it to its previous character.

Volodya had already completed a training session with a previous class of shooters. On returning to the base he said, "Well done, you are on good terms with excellence!"

"What is so excellent about this?" the newcomer from Moscow, the armorer, muttered in reply. (He always liked to grumble a little bit; every one knew this, but quickly forgave this magician his small fault.) "This is done as usual. And you, my lad, show us there is Innsbruck that you know how to shoot from a normal rifle, or that you don't know."

When the hero of the winter Olympics, possessor of a gold medal, Vladimir Melanin returned to Moscow, he first of all made for Lenin Prospect (Avenue) to the apartment of his old friend—the armorer.

"There," he said, putting on a face, "I brought the targets to show to you and to brag about them."

He unrolled his targets with the autographs of the judges and all the competitors. These were the targets which brought to him the cherished gold medal. In the black circles were gaping 20 bullet holes, not a single bullet had missed.

* * * * * *

Small, elegant, buried in greenery, surrounded by the Alps, is the small Swiss city of Winterthur. Here in 1959 was held the

recurrent European Championships.

As is well known, before going on to the firing line, the Board of Judges hang a weight on the trigger with the sear at full cock. Our team went by the check without a reproach. Five Bulgarians and five Poles were detained. To them disqualification from the competition was threatened. A few minutes was spent in considering how corrections could be made. Then someone said, "Ask the Russian armorer, he has golden hands."

And there to the judges—representatives of the well known Swiss weapons firm "Hammerli"—came up a tall, well proportioned, blond man in a blue woolen training suit with the letters "CCCP" (USSR) on the chest. "Will you permit me to take a look?"

He asked for a hammer, an ordinary hammer, and in the course of three minutes increased the weight of trigger to normal on all ten rifles.

Already in Moscow he received two letters—from Barshava (Warsaw) and Budapest. In Polish and in Bulgarian were written down one and the same words, "Thank you for your friendship."

* * * * * *

It should be time perhaps to acquaint the readers with the hero of these stories. And the hero of them is one man—weapons technician of the Central Sports Club of the Army, Soviet Officer Alexei Danilov, Lesha Danilov—as he is affectionately called by his numerous friends.

He has friends in his business in innumerable quantity. Among them are "classic" shooters, pentathlon and biathlon competitors. All of them respect this remarkable craftsman. Every one talks about him with unconcealed admiration, only they ask one another—

"And where did he get such golden hands?"

From where? Most likely it is inherited. The father of Alexei Petrovich Danilov is also a skillful man, a smith. From childhood the lad improved himself in the proud work of this profession. As the years went by, he went to the factory where he worked as a laborer. He was called into the Army and became a weapons armorer. The perfect chance came—the team of the regiment went to a competition and a man was needed who would work with the sporting weapons. Alexei was chosen. He so showed his worth that they immediately began to talk about him. He was called first in the districts then to Moscow. And so the adjustment of sporting weapons became his basic profession, the purpose and aim of his life.

And he, himself, tried to shoot. And this is how well he tried: in 1952 he became a master of sport . . . Comrades promised to him a great sporting career. But he did not take their words seriously . . . .

"For me my own work is dearest of all. Anyone can learn how to shoot accurately."

In his work he is an exceptional man. The "Golden Hands" of the Russian master craftsman know sportsmen of many countries of the world. He has been thanked for amazing craftsmanship and unselfish help by friends from socialist countries, reserved Englishmen, light hearted Americans, temperamental Italians, imperturbable Swedes and Finns and haughty Indian rajahs. The fame of his craftsmanship is legendary throughout the shooting world.

Soviet Sportsmen, of course, value highly his astonishing artistry. Their feeling, their affection for this man, they have gathered into one work, as in a focus, "Unfailing." Unfailing! . . . this word exceptionally characterizes every thing that goes out from under the hands of Alexei Danilov, and the warm-hearted goodness of his true Russian character.

R. Polyakova
"Sporting Life of Russia"
November 1964

AGING EYES AND IRON SIGHTS

By Dr. Wm. M. Lee, O. D.
Custer, S. D.

Regarding the article on page three in the February issue of Precision Shooting, written by Betty Summerall Duncan, about the plight of some of our older Small Bore Shooters, who are having trouble with their iron sights due to failing vision. This is a condition that comes to many of us after the age of sixty and sooner in some forms of visual defects.

Being close to seventy, an Optometrist with some forty odd years experience in fitting glasses, a Bench Rest as well as a Small Bore shooter and having used iron sights in some form or another since I was ten years old, I would like to express my opinion for what it may, or may not be worth.

Younger eyes have the ability to hold the target and front sight clearly in focus at the same time through an aperture rear sight. Even with normal vision, many of us cannot maintain this two way focus after the age of fifty five or sixty. The target remains clear but the front sight is fuzzy.

Some rear aperture sights are designed to permit a small colored disc or lens to be inserted. Usually a plus sphere of from one quarter to three quarters of a diopter, added here acts as a clearing lens which will clear the front sight somewhat without blurring the target much. However a slightly blurred target will cause much less trouble than a blurred front sight. The bull when fuzzy is still round and can be centered in a clear front ring sight much better than a clear bull can be centered in a fuzzy ring. Especially is this true when trying to hold off a little.

I have had my regular prescription made up with this small amount of plus power added, and this lens ground down small enough to be placed in the rear aperture. This permits shooting without your glasses. However if you are wearing much correction, shooting without it will get you in trouble with your shell block, your stop watch and also the spotting scope if your correction is for astigmatism.

I found it much more satisfactory to install this little clearing lens in the rear aperture and shoot with my regular glasses on. This small amount of lens power is but a substitute for the focusing power which the aging process has taken away from us, so it does not create any advantage over the shooter with younger eyes. The amount of power to be added here is governed by the shooter's age, the size of his pupils and the distance between front and rear sights.

The front sight can also be cleared by reducing the size of the rear sight aperture so long as the clear fluids within the eyeball remain "crystal clear." After the age of sixty these are often cluttered up with small clouded areas. Reducing the rear sight aperture shows these up as irregular shaped spots, streaks, bands etc., within the visual field. Occasionally some one will have a twisted up semi-transparent worm like mass floating in an out of the visual field. When this settles into the aperture, all one can do is wait it out and try to get the shot off before it returns again. These are floaters within the fluids of the eye and usually change their shape and position with each quick movement of head or eyes.

First stages of cataract may cause a dark star shaped shadow in the center of the field, or irregular shaped bands across it, also dark finger-like projections pointing toward the center from the outer margin and sometimes a half moon shaped shadow will cover part of the field. Very few people of sixty and over are completely free from some of these little disturbing elements, which again are a part of old age which we cannot control. Usually you are not aware of this until you try to view something through a small peephole such as an aperture sight. This explains why we can shoot with a telescope for a number of years after our ability to cope with iron sights has left us.

No doubt you have heard some of the "oldtimers" say they can no longer see to shoot iron sights on account of the rear aperture being filled up with "cobwebs." This explains the situation completely except the cobwebs are in the shooter's eye instead of the rear sight.

There is very little that can be done about this until such time as Rule Number 5.5 of the Small Bore Rule Book can be changed to include Substandard Vision.

Beginning cataracts as well as some of the before mentioned conditions do not as a rule cause so much trouble in shooting with the telescope. The rear element of the scope does not show these up in the visual field like the peepsight does and besides the ocular lens admits much more light, which allows the pupil to respond and adjust much better, resulting in much better resolving power.

If the vision is not too blurred, the cross hairs if reasonably coarse, seem to cut through a little blur and stand out quite well. Even where the scoring rings are invisible one can quarter a fuzzy bull and place most of the shots within or close to the ten ring.

Permitting the senior shooter with substandard vision to use the "Weaver One Power" scope in the iron sight matches, would give him no advantage over the younger shooters because there is no magnification involved. The size of the target would remain the same. He would have a cross hair with which to quarter the fuzzy old bull, instead of trying to see it through a cobweb filled aperture, which he cannot do.

In iron sight matches there is no reason for the young shooter, finding himself on the firing line beside an "oldtimer," armed with a Weaver One power scope to go into a tailspin, for fear he is going to take a trophy away from him. Even if he were permitted to use a 2½ or 3 power scope, the odds would perhaps still be in favor of the younger eyes and the iron sights.

Occasionally you hear some younger shooter state that he can hold the cross hairs on a bullet hole. It just may be that he can. The senior shooter with his high blood pressure, a heavy pulse beat, arthritic joints, a stiff neck and a tremor in his muscles, is just plain lucky when he can keep the cross hairs from wobbling clear out of the ten ring. This wobbling is more noticeable with higher power scopes. For this reason I can do better with a twelve or fifteen power than with a twenty or more. The wobble is there just the same, but it does not scare you as much. The younger shooter can hold steady and here is the reason that he with his iron sights, can out shoot me as well as many other oldtimers using fifteen power scopes.

Most of the oldtimers know very well when they go to a shoot, that the chances of winning much or anything at all are slim. They simply go for the love of it. To renew old friendships, to make new ones and enjoy just being there, looking over the new equipment, smelling the odor of burning gun powder and still being one of the shooting clan.

For half a lifetime they have been supporting our Organization. Why should they be forced out by substandard vision over which they have no control, when a statement from any Optometrist or Ophthalmologist could verify this. A change in the rules to permit them to use the One Power Scope in the iron sight matches would let them enjoy the sport and the company of their Shooting Buddies for another five or more years.

The department of Motor Vehicles, in granting drivers licenses start adding restrictions to permits in most of the States whenever the vision drops below 20/40. Some at 20/30. It seems to me some such system as this could be worked out and included in Rule 5.5 of the Small Bore Rules. Think this over.

NOTES FROM THE LIBRARY

by

Creighton Audette

One of my friends is a metallurgist who frequently carries out careful laboratory tests to determine facts on the heat treatment of steel, reasons for the differences in cutting tool life, etc. One of his favorite expressions is "There is nothing more pathetic than a hypothesis slain by a fact." I have come to the conclusion that there is something that is more pathetic than this and that is a hypothesis that, phoenix-like, rises from its dead ashes after being slain by a fact, and once more proclaims itself.

My initial impulse upon reading Mr. Hallberg's article, "Observations and Comments" in the November 1964 issue of Precision Shooting was to write him a letter, commending him on the thought provoking article and reminding him of our exchanges, published in Precision Shooting in 1962, on the subject of case shape. I did not get around to do this and had more or less forgotten the matter until the February issue which contained the exchanges of letters between Major George C. Nonte, Jr. and Fred Hallberg. In this exchange, Mr. Hallberg repeated his statements on case shape with rather strong emphasis as quoted below.

"The fact that sharp shouldered cases increase pressures without corresponding increase in velocity has been so thoroughly proved that I can add nothing more to it. I know that factual reports have appeared in the American Rifleman within the past five years and I believe I recall seeing similar reports in Ordnance Magazine during the Korean era."

I have a complete file of bound copies of the American Rifleman and Arms and the Man starting with the January 1921 issue. From 1940 on, I have a cross index on these by author and by subject of every article and "Dope Bag" reference. For those magazines prior to this, I have a card file index for those subjects which are of interest to me. I have clipped articles on arms and ammunition and ballistics from Ordnance Magazine for the past 15 years leaf notebook. I also have a fairly extensive library including British and American and have these punched and filed in a loose-ordnance text books.

In all my reading I have yet to see any report of properly controlled tests on the subject of case shape which indicated that a change in case shape ALONE had any discernible effect on velocity or pressure. It is perfectly true that there have been a number of articles in the American Rifleman, starting in the 1930's where experimeters have reported an APPARENT change in velocity, pressure, or as some of them called it efficiency due to a change in case shape. In the great majority of these articles, it was perfectly apparent that the experimenter lacked even a chronograph, much less equipment for testing pressures. In those rare cases where loads were chronographed, there was always a lack of proof in the article to indicate that the experimenter had established satisfactory criteria to eliminate all of the variables except case shape.

The only article I have ever read on this subject which showed every evidence of having been carried out under precise laboratory conditions was that written by C. C. Meredith in the April, May, June and July issues of the American Rifleman in 1946. I referred to this article and quoted from it in "Notes from the Library" in the November 1962 issue of Precision Shooting, so there is little purpose in reviewing this again. I would be pleased to hear from anyone who has studied Mr. Meredith's article who can point out any faults in his test procedures or conditions. So far as I am concerned, I am perfectly willing to believe Mr. Meredith's conclusions as quoted below.

"Reviewing these tables, it will be seen that, in general, there is absolutely nothing to choose between the three chamber shapes from the ability to produce higher velocity at a given pressure. It is true that there is a difference of about plus or minus one per cent in the final, overall, performance factors, but anyone having laboratory experience with measurements of the type involved in this test will realize that in spite of elaborate precautions, the accumulated experimental error can seldom be reduced to less than about the percentage of difference in these results." . . .

"In conclusion then, we must arrive at the conviction that any variation in pressure-to-velocity ratio ensuing from any alteration in chamber shape is negligible as compared to other purely mechanical changes, such as altering bullet diameter, wear in the throat, and many other differences between any two apparently identical rifles."

May I quote further from other authorities. The following is from Chapter 10 of "Hatcher's Notebook." Major General Julian S. Hatcher, as most of our readers undoubtedly know, had a long and distinguished career as an expert in the field of small arms. To touch on a few of the highlights: He was in charge of the manufacture of small arms ammunition at Frankford Arsenal from 1923 through 1928, served as Chief of the Experimental Department of Springfield Armory, Chief of Machine Gun and Small Arms Section of the Engineering Division of the Ordnance Department in Washington, Chief of the Small Arms Division Ordnance Technical Staff, wrote several hundred magazine articles and at least six books on small arms. He was a pioneer in the field of fire arms identification, investigation and evidence.

"In the years just before World War II, it became the fashion for gunsmiths all over the country to originate 'wildcat' cartridges by 'improving' some factory cartridge and then giving it a fancy designation with the originator's own name added.

The improvement frequently involved necking down the standard case to take a smaller bullet, and it almost always provided increased powder capacity by expanding the case into an enlarged chamber. Usually in the process the shoulder was made considerably sharper than it was in the original. This sharper shoulder is supposed to hold back the powder as the bullet moves forward in the bore, thus giving the powder better burning characteristics.

Making the shoulder sharper does, of course, add powder space, and thus make possible higher velocities, accompanied of course by the inevitable higher pressure. It is conceivable that the sharper shoulders do help the burning of the powder, but as far as I can see, this has not been proved. Very carefully conducted experiments, using chronographs and pressure gages, with cases of the same caliber and cubic capacity but with shoulders of different slopes have failed to show the shape of the shoulder makes any difference at all.

With the increased powder capacity that these wildcat cartridges had, it was inevitable that increased pressures would be obtained. Usually the originator of one of these cartridges had no facilities for taking pressures, and depended entirely on the notoriously unreliable method of judging pressures by the appearance of the primer."

The next authority I would like to quote is Lieutenant Colonel Earl Naramore whose book "Principles and Parctice of Loading Ammunition" carries this description of him.

"Formerly Manager, Small Arms Ammunition Section, Bridgeport Ordnance District; Chief, Small Arms Division, Hartford Ordnance District; Chief Proof Officer, Chief Inspection Division, Operations Officer, and Executive Officer, Erie Proving Ground."

"SHAPE OF CHAMBER AND THE SHOULDER ANGLE"

"The ballistic performance of any firearm is limited by the volume or capacity of its chamber. Regardless of improvements that may be made in powders, the amount of it that can be used will be limited by the capacity of the chamber or cartridge. The shape of a chamber plays a part in the way powder burns but the differences in the powder charges used in such cartridges as we have that are similar in shape is due to their being of different capacities or calibers. It is certain that if of two different cartridges of the same capacity and caliber, one had a short body of large diameter and the other a long body of smaller diameter, their charges would not be ignited in the same way and the burning rates of the two charges would be somewhat different. However, this is related to the shape of the charge, a subject that will be considered shortly as we can have different shapes of charges in any cartridge or in other words, a different distribution of the powder.

The main point that has come under consideration in the shapes of chambers has been the shoulder angles of bottle neck cases. It has long been theorized that the shoulder angle causes the powder gases to 'churn' and that the angle has a material effect upon the way powder charges burn. Superficially plausible, a lot of writers, not excepting the writer, have repeated this theory in a parrot-like manner for many years without giving any thought to it. This theory has been supported by some makers of wildcat rifles who, after altering standard chambers enough to make the angles steeper, found that they got somewhat higher velocities and this was attributed to the change in the shoulder angle. However, **you can not remove metal from a chamber to increase the shoulder angle without enlarging its capacity.** The additional velocity was obtained by the increased amount of powder that could be gotten into the altered chambers.

Several experimenters have chambered barrels of identical bore dimensions in which only the shoulder angles were different, the capacities of the chambers being kept exactly alike. Mounted as crusher gages and fired for velocity and pressure, the differences in velocities and pressures, with extreme differences in shoulder angles, were not significantly different than the normal variations in velocity and pressure that occur with any load and cartridge.

It is easy to consider why this should be so after someone else has done the hard work, but gas behaves according to certain fundamental physical laws, whether it be powder or illuminating gas. Gas flow is considered in two ways; streamline, as illuminating gas flowing through a pipe; and turbulent, as when the gas is all riled up. It is safe to presume that powder gas is turbulent, as the powder is converted from a solid into gas in the space of a few ten-thousandths of a second. The pressure of the gas is exerted in all directions against the walls of the chamber and how it is going to 'churn' or turn back against its own high and increasing pressure is difficult to understand—if one pauses to think about it.

Gas pressure, like any other force, seeks the path of the least resistance for its escape and in a gun this is the path of the bullet, so the effect of the chamber shoulder would appear to be only that of a nozzle, tending to convert the turbulent gas to a streamline flow although with what success is questionable. This is the reverse of the churning theory.

A bit of objective evidence that powder gas does not churn is to be found in the behavior of pressure gages used in artillery cartridges. These gages take the form of small cylinders that are placed in the bottoms of the cases before the powder charges are poured in. If rounds are handled carefully so that no powder grains get behind

the gages, they remain in the bases of the cartridge cases and can be dumped out after the rounds are fired. And this holds whether the cases be straight, tapered or bottle neck. If the powder gas churned at high pressure, these gages would certainly be swished around and shot out of the gun with the rest of the ejecta.

In any event, if the shoulder angle of chambers has any effect at all upon the burning rate of powders, it is a very negligible one."

Before some eager reader leaps on that part of the statement quoted above which says: "It is certain that if of two different cartridges of the same capacity and caliber, one had a short body of large diameter and the other a long body of smaller diameter, their charges would not be ignited in the same way and the burning rates of the two charges would be somewhat different," may I suggest that he study this section of Naramore's book. He will find that these differences, as applied to small arms ammunition, result in negligible changes in pressure and velocity. Naramore explains why this is so and gives a very entertaining account of the effects of variation in the shape of the charge as applied in howitzers, large cannon, etc.

The sections referred to above are all under a chapter heading "Other Conditions That Affect Burning." There is an excellent explanation of the effects of variation in ignition. There is undoubtedly a variation in the ignition between a long slender charge and a short fat charge of a certain powder in cases of different shape, but having the same volume. Naramore's conclusion, at the end of his explanation, is listed below.

"So, in a general sense and with powder suited for full charges in the cartridges in which they are used, ignition fluctuations can be considered as having little effect upon velocity as long as ignition variables keep the pressures within the powder tolerance."

There is no magic about case shape nor the physical laws involved in igniting and burning smokeless powder to propel a bullet from a gun barrel. In fact, among people competent in this field, the laws are so well known that pressures and velocities can be mathematically calculated with a very small percentage of error. Homer Powley's "Computer For Hand Loaders," the instruction manual which comes with it, and the bulletins which are available from him make this perfectly clear. Case shape or shoulder angle are NOT among the variables which are used with the Powley computer, yet to anyone who has a good counter chronograph the accuracy of the Powley computer when used on cases of widely varied sizes and shapes is little short of amazing.

Another statement which is often found in articles on "improved" case shapes is something to the effect that more of the powder burns inside the chamber or, conversely, less powder burns in the barrel, therefore, there is less wear and erosion in the barrel. For all practical purposes all of the powder that is going to burn has done so by the time the pressure reaches its peak. Take a look at a pressure-velocity chart and you will find that the bullet is 1" or 1½" forward into the rifling at the time of peak pressure. Those partially burned grains of powder that you see up near the muzzle of a rifle with certain cartridges and loads were **not** burning when they arrived there. Conversely, smokeless powder may burn **after** the bullet leaves the muzzle. This is because smokeless powders contain insufficient oxygen to completely ignite the gas produced by them while it is inside of the gun. Some of it, at a temperature above its combustion point, bursts into flame suddenly when it comes into contact with atmospheric's oxygen after it issues from the muzzle. As it is heat and not flame that does the work in the gun, muzzle flash has no effect on chamber pressure and its effect on velocity is negligible. (From Naramore's book)

Few amateur experimenters in the small arms field realize the tremendous amount of work which has been done, using the very latest advances of science, in ballistics laboratory tests. The July-August, 1964, issue of Ordnance included an article titled "Ballistic Breakthrough" with a subheading "A New Method Has Been Developed For Taking Very Accurate Internal Measurements Of Projectile Velocity, Acceleration, And Relative Pressure From The Same Test Firing By The Use Of Nuclear Radiation." While the charts and figures produced from this test largely substantiate the pressure-velocity graphs of early experimenters of the smokeless powder era, it is fascinating to see data recorded which simultaneously gives both the chamber pressure and the bullet position as a function of time.

INTERNAL BALLISTICS IV

By Edward M. Yard

HENRY DERINGER in 1825 began making pocket pistols that show he knew his ballistic facts. Deringer's customers had reasons for wishing very compact weapons. They also had reasons for wanting these to be effective. We doubt that they understood the Deringer ballistics, but what we shall see all stems from our work so far.

It is energy in a bullet that counts. Though it may be argued how the energy is attained, none can deny that it is the denominator of bullets. If they have not the energy, they have little else.

What Deringer Saw

Probably without any insight to the mathematics that controlled this, possibly with only a vague understanding of the physics involved, Deringer saw the solution to an algebra equation that meant effective guns you could put in your pocket. And many a maker of guns **had** seen the same thing before. Those in Pistoia, London makers of the pocket pistol, and the artisans of the little flintlocks had the same goal. They probably didn't see it so clearly, were more concerned with making weapons: not too large nor too small.

But in Philly, Henry followed a plan, probably intuitively, and

(11) E=AsP

is the formula for it. His little stingers have proven the point that he knew what he was doing. That he is still being copied is a credit to his understanding of internal ballistics. Those who imitate may not see what he saw, nor understand the equation. It spells a little stinger all right, and this is the meaning of it:—

> E is for energy, and s is for length of barrel (actually bullet travel), P is for pressure, and A is area of the bore. The equation relating them (11) has been stated. Choosing a particular short barrel fixes s. Pressure is limited by gun strength, and if too high will wreck the gun. But A, area of the bore, we may choose to suit, and as we increase it, so do we increase E, the energy.

The Ingredient of small cannons is a large bullet. P being limited and s a little travel, there is no need for a big powder space. This, too, Deringer saw, and so he created the short big bore pistol that used a small amount of powder to hurl a big slug for short distances.

Efficiency Bonus

A bonus is efficiency. More of the energy contained in small charges is delivered to heavy bullets than in other loads. If an attempt is made to up such little loads, longer barrels are needed to prevent a loss of efficiency. It is a limited potential field, but answers one problem **neatly enough.** It should teach us that many things in ballistics are not difficult, but we must see what the controlling factors are.

Equation (11) will apply to any gun whatever, most impartially. You may take your choice of limits, but must abide by the result. Remember that P is here Mean Effective Pressure, in P.s.i. (lbs. per sq. inch), so A must be in square inches, while s will be in feet, giving E (M.E.) in ft. lbs. Note that P is inversely proportional to bullet travel.

PRESSURE

Maximum breech pressure for any load controls its usefulness. In many previous examples we have cited pressure as a limit, and that it is. Changed materials might alter this, but presently the stress of pressure dominates our loading, sets a limit for any cartridge.

In I. B. II, acceleration was shown to be a linear function of pressure and sectional density of the bullet, and was:

(9) a=g(P/S.D.)

By substituting in (5) of I. B. I, and solving for P, we get:

(10) $P = V^2(S.D.)/2gs$

For any particular gun s, the length of bullet travel, is constant, and hence the term S.D./2gs for bullets of the same weight and caliber, and pressure varies directly as the square of velocity.

Now note that equation (7) in I. B. II shows that muzzle energy, M. E. (or E) varies directly as the square of velocity, and is fixed in the same terms. This means that pressure is a linear function of the muzzle energy of any load.

The other side of the Deringer coin faces us, then, with the physical proposition that if we choose a slug and a barrel length, we pay for energy directly in **pressure.** This true comment may have less impact than saying what is equivalent: If you would **double** velocity, pressure **will be fourfold.**

These are mean pressures to be sure, but the peak of any pressure curve depends largely on the mean, generally within the range of 2 to 4 times. Usually a peak pressure, or up to the limits, for normal loads is in the 2½ to 3 times with cartridges like the .30-'06 .308 Winchester and the like. Smaller cases and those yielding less energy often have a much higher ratio, while magnums are as low as 2, sometimes less. But bear in mind with the magnum that yields a mean effective to peak pressure ratio of 1.9 or so to one has an unusually high value of mean pressure, a low efficiency and because of this muzzle blast.

QUESTIONABLE LOADS

Sometimes guns are blown up. Such happenings cause much talk. Seldom are solid facts available. The two obvious causes are a much higher than normal maximum pressure for the load, and a gun with a defect. Both things occur. If the load is **TRULY** a normal one and the gun of reputable manufacture, the chances are rather slim that these are the reasons.

The equations developed by elementary physics that we have presented are for ideal conditions. For normal guns and loads they are quite helpful, and may aid too in understanding accidents. For very tight bullets with tough jackets and a long bearing, fired in a fouled bore, friction factors become important. Pressures much higher than one might expect will occur.

The first lesson here is that pressure can soar to extreme values when factors in the load appearing to conform, in reality vary, **impede** bullet travel. The next is that where all factors are not under real control, we can't expect to predict results. And if factors, even minor ones, that would each tend to raise pressure are combined in one load the cumulative effect may be large. **CAUTION** is our only recourse.

Our previous I. B. III showed that powder burning rate goes up rapidly with pressure. Equally pressure goes up quickly with burning rate. Anything that causes a more rapid rise of pressure than usual is also upping burning rate, and vice-versa. When pressures seem higher than expected, something is wrong. Never continue to

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Internal Ballistics IV

(Continued from Page Seven)

shoot loads where this is evident. In the extreme, most powder charges have the **inherent energy to destroy a gun,** if improperly used.

Energy—Pressure Related

It ought by now to be crystal clear that as guns use the pressure of gasses produced by rapid burning, often referred to as explosion, to drive their bullets with destructive force, then PRESSURE IS a basic part of firearm performance. Pressure is **required** to make them work and, in fact, the more pressure the better. Yes, it is quite true that any increase in pressure that proper loads can provide will improve performance. The history of improvements in small arms and their effectiveness has been largely one of safely increasing breech pressures, building guns to take greater stress, compounding powders to give longer and higher average (mean effective) pressure.

Pressure has been a word to conjure with. Mention it and stout hearted handloaders become uneasy. Maximum pressure is a term something like the sound barrier, some thinking it impenetrable. Many wonder if it means a definite entry into the area of dangerous loads, or more nearly a safe but prudent limit. Most who use the term express themselves as if the first were the intended definition, but wind up nearer the second one. With loads from certain sources, use the first meaning! In any rational terms of reference, maximum pressure must mean a safe and prudent limit, else the use of such loads for any length of time would wreck guns. Maximum loads should conform to this viewpoint, safe and prudent. Shooters maimed by disintegrating weapons are fortunately hard to find, and gunsmiths are not clogged by heaps of bulged firearms waiting for plastic surgery.

Even so some nuts injure themselves and imperil their neighbors with loads that demonstrate the real potential of powder. It has the power and energy, all right, to destroy guns. If used unthinkingly it will. But you can't have effective guns without pressure, and it is thus imperative, basically essential, to understand this, to clearly grasp the role pressure does play in internal ballistics. We can't do without pressure.

REVIEW

We've covered a lot of ground, and so will summarize important points in the first six chapters of this Internal Ballistics series (I. B. 00, I. B. 0, I. B. I, II, III and IV).

We started with the fact that velocity is the fundamental ballistic characteristic of a bullet because both:

(6) Momentum, mV

(7) Energy, $\frac{1}{2}mV^2$

(Muzzle energy)

depend upon V. Without velocity a bullet is an inert lump of matter. Measuring velocity with an accurate counter chronograph gives us reliable basic figures for ballistic calculation and comparisons.

Guns are rather efficient heat engines, deriving all of their power output from the release of chemical energy stored in the powder charge. When ignited, oxygen atoms in the propellant combine with fuels, carbon and hydrogen, by a chemical reaction (oxidation-reduction) or re-arrangement, producing heat.

The products of the reaction are largely gasses which, because of their mass and temperature, when confined to so small a volume as a cartridge case, exert great pressure. The force of this pressure upon a bullet is what moves it and accelerates it in proportion to the ratio of pressure to sectional density of the bullet (P/S.D.). For example a .22 cal. 50 grainer for 3000 F.p.s. muzzle velocity with 20 inches of bullet travel (approx. a 22" barrel) requires a mean effective pressure (M.E.P.) of at least 15,750 lbs./s.i., disregarding friction. This will produce an acceleration of 2,700,000 feet per second per second, average while the bullet is in the barrel.

By applying Newton's laws of motion to bullets, we may calculate values such as those above. M.E.P. may be used to estimate peak or maximum pressures. This derives from the fact that we are able to show velocity squared is a function of acceleration, and pressure a function of velocity squared. Using available data, the ratio of M.E.P. to Pmax may be obtained and the pressure of loads compared.

By the use of comparative powder energy values, relative efficiency of loads may be figured for comparisons of powders and loads. A table of heat contents of many powders when fired in an air filled bomb calorimeter accompanies I. B. III, noting that these figures are higher than tests in a vacuum bomb would show, and both are different than the result in a gun, so are useful ONLY for COMPARISON purposes.

Smokeless powders are composed mainly of colloidal cellulose nitrate, burn according to Piobert's Law by parallel layers. The gas law PV=RT explains how the high temperature T of powder gas in a limited volume (V) results in high values of P, pressure. Because the burning rate follows an equation like that introduced by Sarrau:

$$dy/dt = BP^a$$

which we show may be converted to linear form over most of the range of pressure. Pressure may rise rapidly as a result of minor load changes. Increasing a powder charge has the effect of increasing its burning rate. Bullet sectional density represents a resisting pressure and raising this value raises chamber pressure. Since the factors which tend to increase powder pressure also speed up the burning rate, a cumulative effect that is sometimes drastic occurs.

Equations useful to us have been derived and their application in sample problems illustrated. They are summarized here so that readers may review them in one place:

Symbols used are: F, force in pounds (Lb.), P, pressure in pounds per sq. inch, A, area in sq. ins. (bore) m, mass W/g, where W is weight in pounds and g is the gravitational constant, a, acceleration in feet per second per second, t, time in seconds, V, velocity F.p.s., s, distance in feet, S. D., sectional density of a bullet Lbs./sq. in.

(1) $F = ma$ Force = mass x acceleration

(2) $s = Vt$ $ds/dt = V$, $d^2s/dt^2 = a$ Distance = Velocity x time

(3) $V = at$ $dV/dt = a$ Velocity = acceleration x time

(4) $s = \frac{1}{2}at^2$

(5) $V^2 = 2as$, or $V^2/2s = a$

(6) mV = Momentum

(7) $\frac{1}{2}mV^2$ = Muzzle Energy, E

(8) $F = PA$ Force = Pressure x Area (of bore)

(9) $a = g(P/S.D.)$

(10) $V = g(P/S.D.)t$, or $P = V(S.D.)/gt$

By substituting (5) in (1) we get $F = \frac{1}{2}mV^2/s$

Substituting (8), $F = PA$, we get:

(11) $P = \frac{1}{2}mV^2/As$, or $E = AsP$

By substituting (9) in (5), we get:

(12) $P = V^2(S.D.)/2gs$

(11) and (12) provide the basis for calculating ideal M.E.P. and from this estimating peak pressures.

These relations are listed because they will be referred to in future numbers, and also to help "see", thus understand, how principles of Newtonian mechanics explain why guns work. These may be used for making valid comparisons, but not for calculations that start from scratch, as ideal conditions are assumed. Friction is not accounted for. A M.E.P. figured by (12) would be the **minimum possible** average of pressure that could account for a given velocity, V, from a barrel s feet long and bullet of S.D.

By relating unknown loads to reliable data, such as Du Pont Handloading Information, an ideal calculation can be converted to useful and reasonably accurate estimates of peak pressures and so on, by the following method:

From Du Pont Handloading Information:
.30-'06, 150 grain .3075" Bullet seated .260"
52 grains IMR 4064 gives 2910 F.p.s. with 49,700 P.s.i.
Calculate:
By (7) M. E.=2815 Ft. lbs.
By (11) M. E. P.=2815/.0745 x 2=18,900 P.s.i.
49,700/18,900=2.63, Ratio Pmax/M.E.P.

To work out a load that will be 43,000 P.s.i. approximate maximum chamber pressure, proceed as follows:
43,000/2.63=16,400 P.s.i. M.E.P.
By (11) 16,400 x 2 x .0745=2440 Ft. lbs. M.E.
By

(11) $V^2 = (2 \times 16{,}400 \times .0745 \times 2 \times 225{,}100)/150$

V=2700 F.p.s.
And 52 x 2440/2815=43.5 grains of 4064

Thus a charge of 43 to 44 grains of 4064 could be tried with some confidence pressure would not exceed the 43,000 P.s.i. desired. The load should be checked with an accurate counter type chronograph.

In applying this system, the loads should always be chronographed to assure that M.E. is of the value intended, as this is the only check except pressure testing the load to check the probable pressure. This is especially important if any adjustments in the load are needed to get it to shoot accurately.

Note that results so estimated are tied in closely with sound and accurate test data. An equation that is scientifically sound was used only to compare loads based on experimentally correct values. And this is the only proper way to use such theoretical computations. The equations are right, but limited in what is taken into account. They must be used with solid test results, then results may be accepted as useful, accurate estimates of pressure. When a load shoots well in your gun, but probably is high in pressure, chronograph it and this method will let you estimate how high, perhaps warn you to desist. AND NEVER use such means to work up **over** maximum loads!

In the I. B. Numbers yet to come there'll be more of application of this ballistic knowledge. But by now you've got the real base of the story, and ought to be able to start putting this to good working use. UNDERSTAND what is given here, and you have a grasp of internal ballistics.

An Experimental Ballistics Associates Report

Random Shots

By Betty Summerall Duncan

The world's greatest smallbore rifleman appeared on CBS television's "I've Got A Secret," Monday night, March 8th. Olympic gold and silver medalist, Army 1/Lt. **Lones W. Wigger, Jr.**, proved as competent on the network as on the range. Wig, your performance helped immeasurably to enhance the public image of the entire shooting game!

Lones and **Gary Anderson** (you all know who he is) were guests of honor at a dinner hosted by the New York State Rifle & Pistol Assoc. on February 27th at New York's Statler Hilton . . . That State Assoc. went all out to make their booth at the annual Sportsman's Show in the Coliseum an eye-catcher. To supply pulchritude, they enlisted the services of New Jersey shooter, Marilyn Kress. For the benefit of the photographer, Marilyn, the instructor, pretended to coach the not unwilling Ken Stannard in the standing position—until he was thrown off balance by the line forming at the right . . . May I submit that any clubs suffering from a shooter shortage would do well to engage Marilyn as recruiter . . .

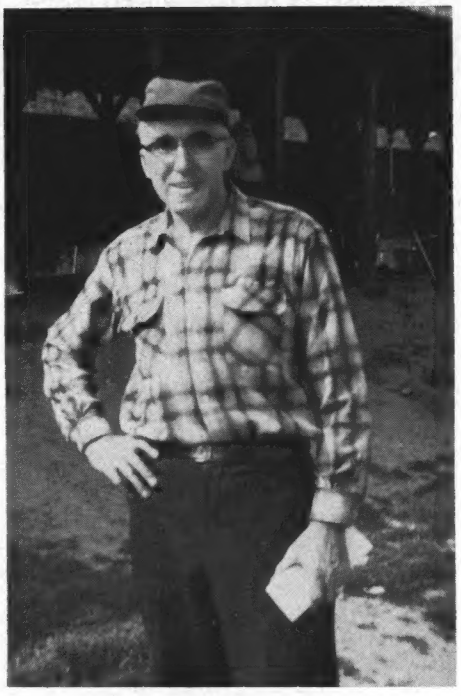
***

Summer sunshine, 65-70 degree temperature with gentle winds welcomed competitors to the **Annual Spring International Matches,** sponsored by the Fresno (California) Rifle & Pistol Club, February 20-21. You military hot shots missed a golden opportunity to splatter outdoor records full of holes.

Freda Wright reports, "Vandenberg AFB teams had a hey-day both at 300-meters and 50-meters." A smaller turnout than usual failed to dim the enthusiasm of civilians from Berkeley and San Francisco in their efforts to outshoot that formidable pair—Chris Petersen, Albany, Calif., and Merrill Martin, Oakland.

At 300-meters it was nip 'n' tuck—: prone—Petersen—384-11 to Martin's 379-5. Kneeling, Chris had a slight edge—362-3 over Martin's 361-4. Standing, the gold medal went to Martin, who turned in a 343-2 to top Petersen's 339-1.

A 1085-15 total for **Chris Petersen** was good for the Match Winner Torphy. Civilian Free Rifle Trophy went home with **Merrill Martin,** who aggregated 1083-11. Second in this category was Fred Forster, Oakland, scoring 1005-8.



Chris Petersen

The Service Match Rifle Trophy was awarded to A/1 Kenneth Preston's 876-3. followed by T/Sgt. John Kotz' 875-2, and T/Sgt. Frank Hilton's 744-1.

In the half course, Civilian Free Rifle, Duane Jenner, Modesto, led 521-10 over Arlan Amaral, Orinda, with 513-1. Robert C. Ribak, Berkeley. fired 500-4. Fresno shooters Arthur Serabian and Dr. John Miller shot outstanding prone scores of 193 and 191, respectively . . . Local competitors, Charles Garabedian—423, and John Rehn—414, took care of the Civilian Match Rifle, half course. event.

Merrill Martin cleaned up at 50-meters, sweeping the prone—392-8, kneeling—382-2. and standing—255 for a decisive 1129-10 victory over Hi Civilian Chris Petersen's 1101-6 free rifle score. Thomas G. Kilfoil. Berkely, shooting 1088-6, was awarded the second civilian gold medal.

With the free rifle, service category. **Gerald S. Maloney,** Air Force reservist (if such an organization remains in existence) had things his own way. His 1102-11 was second best overall score, while Mick Wilkenson, Fresno, staked his gold claim with 1021-6. Kneeling and standing, it was Maloney's show (374 and 341), but Kenneth Haves, USMCR, Fresno, pushed ahead with a 389 prone.

Fergus Ward, San Francisco, won the civilian match rifle trophy with 1071-13.

Competitors in the junior division included two members of Merrill Martin's 4-man team—Merrilvn, who placed third, and Pat Martin in 5th place. Arthur Serabian, with a bit more experience (obviously) was high in all positions with a 1055-6 aggregate. Stu Wilkenson fired 1005-8 for runner-up spot.

***

Passing through Fresno a few days ago. I called Freda and learned that three of Henry Wright's very fine personal 30-caliber rifles are still available (at the appraiser's figure). Among them is his latest International rifle, based on the National Match 8303 Springfield action, Model-T 30-inch barrel, Wright Int'l set trigger, full length rail for palm rest and swivel, adjustable butt plate, French walnut thumb-hole stock, weighing 17 or 18 lbs. with excellent balance. The Wimbledon Gun is a Model 70 Winchester 300 H & H, Douglas stainless steel barrel, Int'l sights. The 1927 Springfield, with Model-T barrel, German set trigger, which Henry shot at Quantico in 1927, is truly a collector's item. Equipped with Lyman rear sight, it has a globe front with special band, and hook butt plate.

***

"I HAVE NEWS FOR YOU" DEPARTMENT—: To the gentleman who considers the **appointment** of the NRA Board of Directors "a **confirmation** of a democratic selection that has already taken place" based on "the number of nominations sent in by individual members" and that "**every man nominated** got on the ballot in the first place by virtue of a large nominating vote by his fellow shooters," I shall write you a personal letters as soon as time permits. You are obviously a new P. S. reader as you are unfamiliar with my previous comments on this subject. Furthermore, you are extremely fortunate in that a most able member of the NRA Executive Committee is from your home town and is, undoubtedly, the popular choice of the shooters in your area.

****

You are familiar with the "law of probability." According to its hypothesis, the 6400-point smallbore prone aggregate, designed to "separate the men from the boys," should be won by a rugged young man with perfect eyesight. From its inception, however, the course has proved to be unpredictable. Viola Pollum, you recall, made history in 1955 by winning the Nationals when the 6400 experiment was first attempted.

In 1962, the Western Wildcats adopted the double Critchfield Aggregate as standard course of fire. That was the year when Herb Hollister, then 62 and proud of it, gave hope to all shooters past the prime of their youth by winning the 4-day marathon. A year ago, Hollister tamed the high-spirited Wildcat pack for the second time, in open defiance of the law of probability. That was two wins out of three tries.

They were lying in wait for him at the 4th annual 4-day **Western Wildcat** fracas February 25-28 in Phoenix. Not only did the 65-year-old champion outwit the younger conspirators, but **HERB HOLLISTER** won his third 6400-point Wildcats Championship on the basis of his iron sight shooting!!!

Hold onto your hats for Hollister's 3197-250X **Metallic Sight Aggregate** is the closest to absolute perfection that anyone has ever attained with irons. Carefully laying the groundwork with a 1598-126X win the first and roughest day, Herb cleaned the three difficult matches only to lose a point at 50-yds. in hte second Iron Aggregate. That left him with 1599-124X, still ahead for the day by 3 points and a pile of Xs. Total of the two days' effort netted him a new National Open and Civilian Record!

In addition, Herb solidified his victory by sweeping the Thursday-Friday Aggregate—3193-259X—and the Saturday-Sunday Aggregate—3196-256X—totaling 6389-515X for the Wildcat Championship.

Significiantly, just as Hollister has reigned as King of the Wildcats for three terms out of four, on each of those occasions, his toughest competition has been the same. For the third time, **George Stidworthy** was runner-up to Herb! Two years ago, George was champ. Between them, one might conclude, there isn't much that they don't know about doping desert conditions.

The first Metallic Agg. was a veritable forecast of things to come. Hollister—1598-125X; Stidworthy—1595-114X; Creed Page, of Grand Junction, Colo.—1594-91X; and Michael H. Allen, Beverly Hills, Calif. —1593-114X. That was the exact order in which the top four finished up in the Grand . . . And, nice shooting, Bill Schlitzkus! The Springfield, Oregon, veteran has been around a few years so doesn't exactly possess youthful eyes. He took the opening Dewar away from Bob Boydston by an X with 400-34X, and placed 5th in the 1st

(Continued on Page Twelve)

National Bench Rest Shooters Association, Inc.

NBRSA OFFICERS AND DIRECTORS FOR 1965

Brunon Boroszewski, President
Chestnut Ridge Road
Orchard Park, New York
Area Code 716, TX4-4433

EASTERN REGION
Dr. A. H. Garcelon (Director)
133 State Street
Augusta, Maine
MAyfair 2-1711
Gerald Arnold (Deputy)
R. D. #2
Gillett, Pa. 16925
Phone: Bently Creek 717 LY6-4085
George E. Kelbly (Deputy)
4 N. Hickin Ave.
Rittman, Ohio
Area Code 216, 925-1501

GULF COAST REGION
J. L. Bonner
P. O. Box 606
Area Code 817, 725-4146
Cross Plains, Texas 76443

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5022 Waverly
Kansas City 4, Kansas
Area Code 913, AT9-6739

MISSISSIPPI VALLEY REGION
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1038 Hornsby Avenue
St. Louis, Missouri 63147
Area Code 314, EV8-2718

NORTH CENTRAL REGION
Walt C. Siewert
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Custer, South Dakota

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925—7th Street
Lewiston, Idaho
Area Code 208, SH3-6135

SOUTHWEST REGION
John B. Sweany
4498 Silverado Trail N.
Calistoga, California 94515
WH2-6633

Secretary-Treasurer
Bernice E. McMullen
607 West Line Street
Minerva, Ohio 44657
Area Code 216, 868-6132

NBRSA MEMBERSHIP DUES:
Individual annual dues $6.00 (includes magazine subscription for membership term). Associate member (wife or husband, son or daughter under 18 years of age, of member in good standing—no magazine) $2.50. Life membership $75.00. Annual club affiliation fee $10.00.

PRESIDENT'S CORNER

This month marks the second printing of the match schedules. Have you decided which ones to attend? Start planning now! The clubs go to a great deal of effort and expense to give us the opportunity of competition in enjoying our sport. Let's make it our business to get out and shoot. We want to see more new faces than ever before. New members or old—if you haven't shot before come on out and give us a licking—we know you can do it—and give it a try.

The new rule books should be available by the time you read this issue. (Order them from the NBRSA Secretary, 607 West Line Street, Minerva, Ohio 44657.)

The committees are now working to start the new series of articles on the bench rest game. We should be ready to go by the May issue.

To get back to my pet project. Remember—"double the membership"—what have you done about that new member we asked you to get? On January 6, 1965 we had 988 members. On March 6, 1965 we had 1052 members. In two months a gain of only 64 members. We'll never make it at this rate. SIGN UP THAT NEW MEMBER NOW!

Cordially,
Brunon V. Boroszewski

FIRST 300 METER COURSE HEAVY VARMINT COMPETITION

The Chippewa Rifle Club has announced a 200-yd.—300 meter match for heavy varmint rifles. These five 5-shot matches at 200 yards and 300 meters have been added to the tournament scheduled for May 8th and 9th, 1965 at Easton, Ohio.

The local experts would welcome a lot of competition. For further details write to the club as listed under the published Match Schedule. Easton is just a couple of miles southwest of Akron, Ohio.

1965 BENCH REST MATCHES

EASTERN REGION

Augusta, Ohio: April 10 and 11 (Unrestricted and Heavy Varmint); July 3 and 4 (Unrestricted and Heavy Varmint); September 18 and 19 (Eastern Region Unrestricted Rifle Championship). Reed's Run Rifle Range, P. O. Box 66, Augusta, Ohio.
Staunton, Virginia: April 24 and 25 (Unrestricted Bench Rifle). Stonewall Rifle & Pistol Club, c/o J. D. Perry, 409 Du Pont Ave., Staunton, Virginia.
Easton, Ohio: May 8 and 9 (Unrestricted Bench Rifle—300 meters); May 29 and 30 (Ohio State Championship, Unrestricted Bench Rifle and Heavy Varmint); July 17 and 18 (Eastern Region Varmint and Sporter Championships). Chippewa Rifle Club, Inc., S. A. Buchtel, Sec'y, 210 W. Chestnut St., Wauseon, Ohio.
Wapwallopen, Pa.: May 22 and 23 (Unrestricted Bench Rifle and Heavy Varmint); June 26 and 27 (Unrestricted and H. V.); August 28, 29, 30 and 31 (National Championships, Unrestricted Bench Rifle). Council Cup Rifle Range, c/o Robert W. Hart, 332 Montgomery St., Nescopeck, Pa.
Fassets, Pa.: June 5 and 6; July 24 and 25 (Pennsylvania State Championship); October 2 and 3 (All Light and Heavy Varmint and Sporter classes). South Creek Rod and Gun Club, c/o Gerald Arnold, Sec'y, R. D. #2, Gillett, Pa.
Johnstown, N. Y.: June 12 and 13 (Unrestricted Bench Rifle, Heavy and Light Varmint classes); September 3, 4 and 5 (National Championships, Heavy and Light Varmint and Sporter classes). Pine Tree Rifle Club, Inc., c/o Edward J. Sweeney, 501 North Market St., Johnstown, New York.
Canton, Ohio: June 19, July 12, August 7, September 25 (All Heavy Varmint class), Canton-McKinley Rifle Club, c/o R. H. Johnson, 3118 11th St. S. W., Canton, Ohio.
Charlotte, North Carolina: July 31 (100 yd.) and Aug. 1 (200 yd. Heavy Varmint—North Carolina Championship). Charlotte Rifle and Pistol Club, William Griffin, Sec'y, 220 Robinhood Road, Charlotte, N. C. 28211.

MISSISSIPPI VALLEY REGION

St. Louis, Mo.: April 10 (Heavy Varmint & Sporter—10 A. M. & 4 P. M.) and April 11 (Light Varmint—9 A. M.); May 8 (Sporter & Heavy Varmint—10 A. M. and 4 P. M.) and May 9 (Unrestricted Bench Rifle, Open and Limited—9 A. M.); June 26 (Unrestricted Bench Rifle O. & L. 10 A. M. and Light Varmint 4 P. M.) and June 27 (Heavy Varmint—9 A. M.); July 18 (Hunting Rifle, not reg.—10 A. M.); July 25 (Varmint Hunters, not reg.—10 A. M.); September 12 (Hunting Rifle—10 A. M.); September 26 (Varmint Hunters—10 A. M.). Miss. Valley Regional Championships, October 2 (Light Varmint and Unrestricted Bench Rifle, O. & L.—8 A. M. and 1 P. M.) and October 3 (Heavy Varmint and Sporter—9 A. M. & 1 P. M.). Bench Rest Rifle Club of St. Louis, Larry Kuenz, Sec'y, 2912 Lincoln, St. Louis, Mo. 63121.

GULF COAST REGION

Abilene, Texas: May 29 (Unrestricted Bench Rifle) and May 30 (Heavy Varmint class); July 17 (Sporter class) and July 18 (Light Varmint class). West Texas Sportsman's Club, c/o John D. Richardson, 2660 Rountree, Abilene, Texas.

NORTH CENTRAL REGION

Iowa Falls, Iowa: May 22 (Sporter class—nite) and May 23 (Varmint class—9:00 A. M.) June 26 (Varmint—nite) and June 27 (Sporter—9:00 A. M.) July 31 (Sporter—nite) and Aug. 1 (Varmint—9:00 A. M.) Sept. 11 (Varmint—nite) and Sept. 12 (Sporter—9:00 A. M.). Iowa Falls Gun Club, Lee R. Boddy, Sec'y, Iowa Falls, Iowa.
Buffalo, Wyoming: May 2 (Crow Shoot), July 10 and 11 (Reg.—Limited Bench Rest and Heavy Varmint classes), August 29 (Sporter Match—not Reg.). September 26 (Hunter Match). Buffalo Outdoor Rifle Club, Inc., C. C. Hankins, Sec'y, P. O. Box 151, Buffalo, Wyoming.

NORTHWEST REGION

Seattle, Washington: May 2 (200 yds. Limited and unlimited Bench Rest, Heavy and Light Varmint classes). June 19 and 20 (Reg. Limited and Unlimited Bench Rest, Heavy and Light Varmint classes). July 25 (100 yd. Limited and Unlimited Bench Rest). August 14 and 15 (Reg. Limited and Unlimited Bench Rest, Heavy and Light Varmint classes). Puget Sound Bench Rest Rifle Club Inc., John Sparrow, Sec'y, Rt. 1, Box 769, Auburn, Wash. 98002.

SOUTHWEST REGION

Yreka, California: May 29 and 30, Memorial Day Shoot—four classes; registered. September 4 and 5, Fourth Annual West Coast Championship — four classes, registered. Yreka Rifle Club, programs from Ray E. Jones, 508 Knapp St., Yreka, California.

COMPETITORS NOTE

The match schedules in March listed matches in various places under one of three different titles as follows:

1) Unrestricted
2) Unrestricted bench rifle
3) Unrestricted bench rifle, Open and Limited

All of these will be corrected to one title—"Bench Rest Rifle, Unrestricted and Restricted Rest." This is the rulebook nomenclature for unlimited weight bench rest rifles—the virtually wide open competition. These rifles have no weight limits, no stock limits, no scope limits, no caliber limits. These rifles may be fired on a mechanical return to battery rest called "unrestricted rest." They may also be fired with a sandbag rear rest, then called a "restricted rest." They are designated as "Bench Rest Rifles" as opposed to "Heavy Varmint Rifles" or "Light Varmint Rifles" or "Sporter Rifles."

Should a competitor choose to compete in a "Bench Rest Rifle" match with a Heavy Varmint or a Light Varmint or a Sporter Rifle—he is entirely free to do so. By the same token a competitor could choose to compete in a "Heavy Varmint" match with a "Sporter Rifle." Any records would of course be recognized only for the **class of competition** being fired and not for the **class of rifle** the competitor used.

The opposite is of course not permissible.

It would be interesting to see how well the so-called Varmint and Sporter Rifles would do against the Bench Rest Rifles.

Brunon V. Boroszwski

NATIONAL BENCH REST RIFLE CHAMPIONS

YEAR	NATIONAL CHAMPION	MATCH LOCATION	AGGREGATE	100 YARD CHAMPION	AGGREGATE	200 YARD CHAMPION	AGGREGATE
1954	Edward McNally	Custer, S. D.	1.705"*	M. H. Walker	.498"	Edward McNally	1.638 inch
1955	Samuel Clark, Jr.	Johnstown, N. Y.	.4098 MOA	Ralph Pride	.3438"	Samuel Clark, Jr.	..4612 MOA
1956	C. C. Hankins	San Angelo, Tex.	.5104 MOA	Henry W. Barton	.4422"	C. C. Hankins	.5690 MOA
1957	Harold L. Hale	DuBois, Penna.	.47175 MOA	Omar Rinehart	.3132"	Paul Gottschall	.5124 MOA
1958	Robert W. Smith	Tulsa, Okla.	.6557 MOA	Harold Shipley	.566"	Robert W. Smith	.6583 MOA
1959	Paul O. Gottschall	Johnstown, N. Y.	.4668 MOA	Paul Gottschall	.3346"	Robert W. Hart	.4757 MOA
1960	Homer L. Culver	Tulsa, Okla.	.6004 MOA	Ferris Pindell	.3986"	Robert W. Hart	.7444 MOA
1961**	Cline Deere	Johnstown, N. Y.	.4399 MOA	Ferris Pindell	.3508"	Cline Deere	.4766 MOA
1962	Brunon V. Boroszewski	Tulsa, Okla.	.5614 MOA	L. E. Wilson	.3762"	B. Boroszewski	.6391 MOA
1963	Paul O. Gottschall	Wapwallopen, Pa.	.4737 MOA	L. E. Wilson	.3172"	Paul Gottschall	.5198 MOA
1964	Homer L. Culver	Tulsa, Okla.	.4705 MOA	Eldon L. Stolle	.3333"	Homer L. Culver	.5619 MOA

* For this Championship Match the championship aggregate was calculated by adding the 100 yard aggregate in inches to the 200 yard aggregate in inches (both aggregates representing the average group measurement in inches) and dividing the result by 2 for the total average group size in inches. For all following National Championships the aggregates for 200 yards and the championship are reported in minute-of-angle.

** The championship course of fire from 1954 through 1960 inclusive was five 10-shot record matches at 100 yards and five 10-shot matches at 200 yards. For 1961 and following years the course of fire was ten 10-shot record matches at 100 yards (five matches on each of two days) and ten 10-shot matches at 200 yards (five matches on each of two days).

HEAVY VARMINT CLASS NATIONAL CHAMPIONS

1960	John I. Moore	San Angelo, Texas	.507 MOA	Edward Shilen	.343"	John I. Moore	.595 MOA
1961	Warren Page	Augusta, Ohio	.4556 MOA	Warren Page Gerald Arnold	.3834" .3834"	John Hutchinson	.4692 MOA
1962	Paul O. Gottschall	Wapwallopen, Pa.	.3308 MOA	Paul Gottschall	.2742"	Harry Bente	.3376 MOA
1963	Wallace Hart	St. Louis, Mo.	.3851 MOA	Wallace Hart	.3344"	Paul Gottschall	.4159 MOA
1964	Thomas Gillman	Abilene, Texas	.382 MOA	Dr. Sam Nadler	.326"	Horace Powers	.366 MOA

LIGHT VARMINT CLASS NATIONAL CHAMPIONS

1960	Paul O. Gottschall	San Angelo, Texas	.636 MOA	Warren Page	.569"	Paul Gottschall	.646 MOA
1961	Edward Shilen	Augusta, Ohio	.5236 MOA	Harold Campau	.443"	Edward Shilen	.5165 MOA
1962	Harold E. Campau	Wapwallopen, Pa.	.3822 MOA	Harold Campau	.3046"	Harold Campau	.4599 MOA
1963	Dave Hall	St. Louis, Mo.	.4509 MOA	Dave Hall	.4574"	Dave Hall	.4444 MOA
1964	Thomas Gillman	Abilene, Texas	.528 MOA	Tom Gillman	.386"	Tom Gillman	.670 MOA

SPORTER CLASS NATIONAL CHAMPIONS

1960	R. L. McLaren	San Angelo, Tex.*	.944 MOA	Paul Gottschall	.672"	Lawrence Rucker	1.013 MOA
1961	M. H. Walker	Augusta, Ohio	.6138 MOA	M. H. Walker	.5258"	Paul Gottschall	.6152 MOA
1962	M. H. Walker	Wapwallopen, Pa.	.5450 MOA	M. H. Walker	.5450"	Warren Page	.5257 MOA
1963	Dave Hall	St. Louis, Mo.	.4774 MOA	Warren Page	.5214"	Dave Hall	.3925 MOA
1964	Dr. Sam Nadler	Abilene, Texas	.577 MOA	Dr. Sam Nadler	.439"	Peter Horowitz	.586 MOA

* In 1960, only the Light Varmint and Heavy Varmint class matches were NBRSA approved as National Championships, due to the fact that an official course of fire for the Sporter class had not been approved by NBRSA at that time. However, the matches were programmed and fired over the same course of fire as the Varmint matches (five 5-shot matches at each 100 and 200 yards) and that course of fire was adopted as "official" and the 1961 matches were approved as a National Championship. The 1960 records for Sporter class are included in this tabulation for comparison.

THREE-CLASS GRAND AGGREGATE: The NBRSA has never approved and recognized a three-class (Light Varmint, Heavy Varmint and Sporter class) grand aggregate National Champion. However, at the 1961 matches at Augusta, Ohio, the shoot sponsoring Reed's Run Rifle Range awarded a special plaque to the winner of a three-class grand aggregate and since that time this aggregate has been computed and reported, and has become a traditional feature of Varmint and Sporter National Championship shoots. Warren Page was winner of the plaque in 1961 with a .5691 MOA aggregate, and was the aggregate winner again in 1962 with a .5301 MOA aggregate. Dave Hall was the 1963 winner with .4887 MOA aggregate, and Tom Gillman was the 1964 winner with a .5299 MOA aggregate.

These statistics were arranged by P. H. Teachout, PRECISION SHOOTING editor.

Bench Rest Match Reports

MINNEAPOLIS, MINNESOTA

Mr. Wm. L. Jones reports: As a result of your letter of May 1961, August Dellwo and myself joined the Gopher Rifle Club to try to promote bench matches. The range we shoot on is used by three clubs. Our first match was held in 1962. We have had rough sledding—three or four matches in 1963, the same in 1964, but we are looking forward to 1965 as we have a schedule for a shoot a month.

We have a rough range to shoot on, wind-wise. We shoot at 200 yards, as we have no moving backers, with rifles of the Heavy Varmint class.

For anyone wishing more information about these matches, Mr. Jones address is 5539 Lyndale Avenue South, Minneapolis, Minn. 55419.

At a shoot on December 6, 1964 (6° below zero in the morning) nine shooters fired ten 5-shot matches at 200 yards. Jones had the winning aggregate of .582 MOA, Lawson 2nd with .715 and VanDeWeghs 3rd with .781. VanDeWeghs shot smallest group of .437 inch with a Winchester 220 weighing 13 lbs. Jones shot a Rem. 722 in .222 and Lawson a 40X in .222.

ABILENE, TEXAS

The West Texas Sportsman's Club held its first Benchrest shoot of the year February 7th at the club range near Abilene. The heavy varmint and light varmint classes were shot, as will be the program on the first Sunday of each month through October.

Conditions were better than average for our range at this time of the year, constituting a good time for all contestants as well as visitors. We had some twenty eight guns participating, mostly 222's with a couple of 6mms.

The heavy varmint class was won by Dick Farrar with a .332, second place went to John D. Richardson with a .363, third to Henry More with .399, and fourth to Grady Carter with .574.

The light varmint class was shot after lunch, Henry Moore taking top honors, shooting a .243, with a .398 aggregate, 2nd was Dr. Roy Nollkamper with .469, 3rd John D. Richardson .516, and 4th George J. Smith .590. George is one of our new shooters.

Both classes were shot on the 100 yard range with Dr. Roy Nollkamper doing an excellent job as range officer. Trophies were awarded to the first four places in each class.

John D. Richardson

RICHMOND, CALIFORNIA

Sixty-one shooters participated in the St. Valentine's Hunter Matches at the Richmond Rod and Gun Club on February 14th. Five 5-shot matches at 100 yards on the 50 meter target constituted the aggregate course.

Hukkanan was winner with score of 237-15x and O'Leary was runner-up with 237-13x. Ken Hobbs was 3rd with 235-14x and was the first to shoot a single target possible 50 score. Kit Puett was 4th with 234-11x and Dr. Earl Jacobson 5th with 232-11x.

The steadily growing number of shooters participating in these HUNTER RIFLE matches attest to their popularity. Quite noticeable is the growing number of women, junior and iron-sight shooters. All this indicates the potential of this type of shooting program as a family recreation activity.

The next of these HUNTER RIFLE bench rest matches will be held at the Richmond Rod & Gun Club (Calif.) on April 11, 1965.

NOTE—A RECORD CORRECTION

In the NBRSA Records, published in the March 1965 issue, the Heavy Varmint class 5-shot group record listed is incorrect. Change that record to: Group size .1923"—fired by Tom Gillman—at Hot Springs, Arkansas—on June 27, 1964.

Bernice McMullen
Sec'y-Treas. NBRSA

Bull-Session Stuff

(Continued from Page Three)

Several steps are involved in working down 30-06 brass. With R. C. B. S. dies; first taper the 30-06 case, size in .250/3000 neck-file die and cut off excess with a hacksaw, trim to length in a Wilson case neck trimmer, expand neck with a .265 expander, ream with a 6.5mm reamer, size in a .22/250 that has been neck polished to .257, outside neck size in a Forster turner, inside ream with a 7/32" reamer, size in a .22/250 die with .255 neck, load and fire form with 8 grs. Bullseye and Cream of Wheat, size again in the .255 neck die, inside ream with a .223 reamer, slightly taper inside of case neck with a #4 taper pin reamer and polish inside of case neck as desired. Nothing to it!

In my estimation the L. E. Wilson case trimmer is the best for neck trimming. Forster is fine for outside neck turning, but my rifle chamber necks have a slight taper toward the front—reason for fire forming after outside neck turning, and before final reaming. Too, the Wilson case holder, for the neck trimming tool, is just held in the hand while inside case neck reaming with tap wrench holding the reamer. It is as accurate as any means I have found. Reason for the separate reaming jobs is that it is easier to ream out a little bit at a time instead of trying to hog it all out at one time. Besides, it is more accurate.

Watch those sized 30-06 to .22/250 cases for volume, and start 'way low on the volume of powder listed in the loading books for the .22/250. I weigh formed cases and separate accordingly. Then Ball-C powder is used to check case volume, and again separating according to volume. Actual case volume is not determined, but you do wind up with a batch of cases with the same volume. One can also get an idea of the difference in volume between a case formed from .250/3000 brass and one formed from 30-06 brass, with Ball-C. Once, in working new Remington unprimed 30-06 cases to .22/250, two cases were found in the batch that would not hold 27 grs. of 3031 after being formed. That is unusual, and the rest were OK.

If anyone who should happen to read this would be discouraged, instead of loving to experiment with, and improve (?) the shooting game, he just ain't no Gun Nut nohow! Like I don't fully agree with being so fussy about bullet jacket wall thickness variation. Them damn jackets cost too much to cull 'em, and who knows what happened to the thick side after the core is seated, and the point is formed? Things don't stay put when a gal puts on a girdle, do they —!? Usually it is an improvement, and I try to imagine —, well, it's easier to imagine! Seriously, shouldn't a little more attention be given the texture, or composition, of the bullet jackets?

Among remnants of my bullet jackets are those when core seated to .2239, will point form to .22385—.2239—.2240—.2245 which are almost impossible to extract from the die. Some will form a pressure ring and some will not. Naturally, all are from different lots. Perhaps I do not have the equipment, or the ability but, honest Injun, I can't tell which shoots the best.

One batch of Kampen jackets that are being hoarded, make the prettiest bullets of any and, consequently, seem to shoot best. They also make a good 200 yard shotgun in front of a full head of steam in a .22/250.

Finally, it was nice to learn that Mr. Fred E. Wood will continue the Bahler die business. Mr. Bahler was certainly nice to do business with. With both Bahler and B&A dies, one can make most any kind of .22 cal. bullet, from hollow base to boat tail in any reasonable .22 size—also some weird combinations.

Random Shots

(Continued from Page Nine)

Metallic Agg. with 1591-119X—10Xs ahead of Karl Kenyon, whose new receiver sight he is reportedly using . . . The army of BSA shooters is worth mentioning—Creed Page, Boydston, and Tom Guerin, who won the 50-yd. iron with a possible and 33. The 100-yd. and Dewar went to Hollister.

Now, I actually think scores are pretty dull reading, so—don't expect all of the good scores that were fired to appear here. Besides, I wasn't there for the tournament (I refuse to call that many matchs "a match"), and my idea of punishment is to be forced to build a story around scores alone. A 1-day shoot is difficult enough to write about with no background material, but just consider a 4-day tournament with all the various aggregates!

Had Hollister stayed with his Anschutz all four days, instead of switching rifles on the second day for the 1st any sight aggregate, it is entirely possible that he would have picked up the 3 points he needed to break the 6400-point aggregate record. Herb is using the Anschutz receiver sight, Int'l front sights for 50 and 100-yds, B & L scope, with Heinz' "57 varieties" of ammo.

The initial Scope Agg. went to the National Ladies' Champion, **Inez Sargent** of Sugarland, Texas. Firing 1599-125X, Inez was 2Xs ahead of Dick Burkhart, and 3Xs up on Mike Allen, both Los Angeles Rifle & Revolver Club stars . . . Dr. Leonard Brewster, of Apache junior fame, now a Tucson dentist, won the Dewar—400-28X; Stidworthy, the 100-yd.—400-32X; Mike Allen, 50-meters—400-35X; and Hollister, 50-yds.—400-38X.

For the record, let's combine the scope matches, even though they were two days apart. The second Dewar went to Allen—400-33X; 100-yd. — Stidworthy—400-37X; 50-meter, Allen—400-36X; and 50-yds., Hollister again with 400-38X. Stidworthy took the Agg. with 1599-136X, followed by Allen's 1599-135, Raymond Sargent's 1599-125, and Bill Halsted's 1599-115X.

And, we arrive at the next sensational display of shooting—this time on the part of the Wildcat Any Sight Champion, Sgt. **Michael H. Allen**, USMCR. Dropping but 2 points for a 3198-257X, Mike erased Lones Wigger's National Reserve Record. (Note: Wigger still holds the National Service Record with 3198-259X for the double Any Sight Agg.). Mike considered conditions so readable that he attributes the two shots he lost to uncoordinated (jerky, if you prefer) let-off. His rifle is a 52-C with Douglas stainless barrel, Bell front sight (which isn't available just now), Int'l rear. The 1963 NRA Int'l Prone Team member fired Mark III ammo.

Following Mike in the Wildcat Any Sight Championship were—you guessed it, Stidworthy in 2nd place with 3196-271X, Raymond Sargent—3195-238X, Bill Halsted—3195-237X, and Inez—3194-238X . . . I would particularly like to call your attention to Bill Halsted's excellent score, without detracting at all from the others. They have been at it a number of years and we expect them to shoot like that. Bill, however, is a comparatively new shooter. From the beginning, he exhibited unusual interest. Through determined effort and practice, he has developed into a terrific holder. Observing the champions and asking questions, he has gradually acquired his own techniques. Nice going, Bill. You are really on your way now. He is, incidentally, the new treasurer of the Los Angeles

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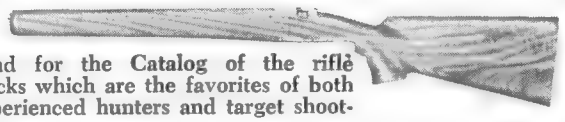

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Rifle & Revolver Club. He shoots a 52C in a beautiful custom "zebra" stock—at least, the grains in the wood resemble a zebra's stripes.

In the 2nd Metallic Agg., Creed Page's 400-31X Creedmoored Hollister in the Dewar; Hollister produced the only possible at 100-yds., and took the meter with 33Xs; which brings us to the 50-yd. It was won by **John Bertell**, of Granada Hills, Calif., with a 400-38X, good for co-holdership of the National Junior Record!!! He also claimed the Wildcat Junior Championship with a 3178-215X in the Saturday-Sunday Agg. Keep your scopes trained on this teenager. He is a shooter to watch.

We have given you Hollister's 6389-515X—so, for additional Wildcat Championship statistics—:

Stidworthy	6387-493X
Creed Page	6381-424
Mike Allen	6378-471
Raymond Sargent	6378-429
Bill Atkinson	6372-431
Tom Guerin	6369-429
Karl Kenyon	6369-416
Bill Schlitzkus	6368-449
George Whittington	6368-438
High Lady—	
Inez Sargent	6368-426
Clarence Cope, Albuquerque	6368-394X

Let us continue on through the top 15, for I think you'll be interested in the next 3 names—:

August Westergard, Sloan, Iowa	6367-398
Bob Boydston	6365-452
James A. Hinkle	
Fairfax, Virginia	6365-397

Harlon Carter established half a dozen new National Police Records which we'll enumerate next month with other highlights.

***

Looking back:

Occasionally, time and space prevent using all material which reaches us. One bulletin, however, which was sidetracked in transit, is written in perhaps the finest penmanship that I have ever seen. My appreciation to our good friend, **John R. Tucker, Sr.**, of Roanoke, Virginia, for copying the complete bulletin of the North Carolina State Smallbore Championships, which were fired last fall in Charlotte. After deciphering bulletins where individuals are reduced to competitor **numbers**, it is a joy to read this one where Mr. Tucker has written out complete names of competitors. (The practice of using merely 1 initial can be confusing). He has also identified each match by the course of fire, not leaving it to the reader's imagination to guess which match #3 was. (One such bulletin listed 9 individual prone matches. I never did figure that one out.)

The "Tar Heel State" title went to a young lady from Asheville, who has been making shooting news for the past two years—16-year-old **Mary Parris.** It was decidedly to her credit that she outmaneuvered rough winds with a higher X-count than the two more experienced gentlemen who finished with her in a 3-way point tie. It is most unusual for the winner, 1st Master, and 1st Expert to have the same point total. Mary became North Carolina State Champion with 3165-175X, as R. D. LeGrand, Cary, N. C., was awarded High Master honors for his 3165-147X. High Expert Preston Sheppard of New Bern, N. C., scored 3165-160X. John R. Tucker, Sr. was 2nd Master with 3161-168X. He also won the 100-yd. metallic with an exceptional 397-18X in view of the conditions . . . Individual match winners were enthusiastic over being given a choice between merchandise certificates and medals . . . Interesting to note that Gil Humpreville and his son, Mark, arrived for the scope matches, in which Gil was runner-up to Norman Boger.

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TOURNAMENT CIRCUIT

MRL 50 SHOT CHAMPIONSHIP

The Metropolitan Rifle League's traditional 50 Shot Championship match was fired on the II Corps Armory range in Brooklyn, N. Y., on February 14th with 74 shooters competing. The course of fire is 50 shots prone at 100 yards, indoors, with smallbore rifles (.22 cal. rimfire) and telescope sights.

This match always draws top-flight smallbore riflemen from a wide area and is always very keenly contested. This year was no exception. The top 13 shooters fired 500 possible scores and the lowest score fired was a 485.

Sam Burkhalter won the championship with a 500-43x score. Ransford Triggs and Walter Tomsen ranked second and third, both firing a 500-42x score. A. Rosenblatt and Lloyd Norton both scored 500-41x to rank fourth and fifth. F. Eichler with 500-40x was sixth. Others shooting 500 scores, in order of ranking, were: J. Maher, L. Moore, I. Tekulsky, R. Leslie, J. Lantelme, M. Coughlin and M. Kaiser. J. Holle dropped a single point but tied Burkhalter's X-count (499-43x).

POLAR BEAR RIFLE MATCH

On January 31st, the North Star Rifle Club of Minneapolis, Minn. put on their Fifth Annual Polar Bear Hi-Power Rifle Match. It called for 10 shots each standing and sitting rapid at 200 yards, 20 shots slow at 300, and 10 rapid at 300 yards. Two sighting shots were allowed at each range. The weather was not good. It was 15 degrees below zero when the first relay got on the line at 200 yards and by the time the shooters reached the 300 yard line it was also snowing so heavily that you could just barely make out the targets. Nevertheless, 30 shooters from a radius of 150 miles took part in the match and really had a great time.

Those who made the first relay were the lucky ones and, despite the cold, the aggregate winner, John Colombo, turned in a very respectable score of 241-8V. He was followed by Masters John Wilder with 239-10V and Donald Wardrop with 231-11V. Carsten Anderson was high Expert with 237-9V. All were sufficiently padded to dispense with shooting coats. The North Star Range is about 25 miles north of downtown Minneapolis.

Fred Hallberg

MODESTO, CALIFORNIA

On February 27 and 28, at the Modesto Rifle Club, 101 shooters competed in an NRA Open Gallery Rifle Sectional tournament.

Vilho Ahola, of the Petaluma (Calif.) Police Department, won the Sectional Championship by outranking Ken Cummins of Sebastapol. Both shooters had the same score going into the standing stage—and both came off the line with standing scores of 192—and 790 aggregate scores.

Second and third Master awards went to Gordon Taras, San Jose 788 and Irvin Brown, Ukiah 787. Larry Wilkins, San Leandro, was high Expert with 781 and Loyd Fischer, also of San Leandro, took top Sharpshooter and Junior award with another 781 score.

Winning team was Pacific No. 1 from San Francisco, with Fergus Ward scoring 397, Fred Forster 395, Gordon Taras 395, and Harry Littell 390 for team total of 1577. Ukiah was runner-up team with 1572.

Shooting at 300 yards slow fire in snow storm at the Polar Bear Match.

BROOKLYN, NEW YORK

Fifty-three individuals and twenty-four two-man teams participated in the Metropolitan Rifle League's Spring Individual and Two Man Team tournament at the II Corps Armory in Brooklyn on March 7th. Course of fire was 40 shots at 100 yards, indoors, with smallbore rifle and any sights.

Eleven shot possible 400 scores in the individual match; Sam Burkhalter winning with 400-35x and followed by A. Battisto 400-33x, W. Tomsen 400-31x, A. Rosenblatt 400-31x, and F. Eichler 400-30x.

R. Triggs and A. Rosenblatt won the team match with 800-65x. G. Tomsen and W. Tomsen had 800-62x, J. Holle and F. Boyd 800-54x. S. Burkhalter and C. Johnson had 799-61x.

Sam Burkhalter won the two-match individual aggregate with 800-67x and was followed by A. Rosenblatt 800-66x, W. Tomsen 800-63x, F. Eichler 800-62x, and G. Tomsen 800-52x. R. Truesdell scored 799-65x.

LIBERTYVILLE, ILLINOIS

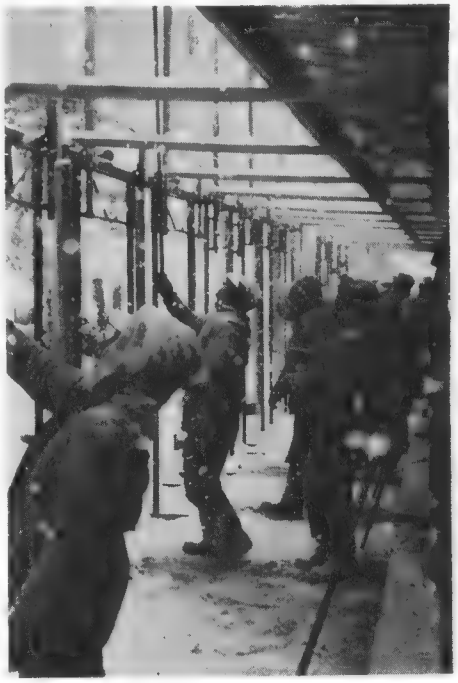
John Krupka of Wilmette outshot 60 other competitors at the 16th annual Spring Gallery Rifle Tournament sponsored by the Libertyville Gun Club. Not only did Krupka win by a decisive margin of 13 points over his nearest competitor, he also established a new range record of 960 out of 1000 and won all but one of the eight individual matches.

Krupka started with match No. 1 (10 prone and 10 offhand, iron sights) with a winning 194 score. Clarence Ardelt of Wheaton won No. 2 (10 sitting and 10 kneeling with iron sights) with a 198. Krupka then won match No. 3 (same as No. 1 but any sights) with 196, No. 4 (same as No. 2 but any sights) with 198, and the 20 shots standing with any sights with a 194 (another new range record).

A special Junior trophy for the aggregate of the two iron sight matches was won by Charles Paden of Evansville, a collegiate shooter, with a 380 score.

Following Krupka in the grand aggregate were Ardelt 968, Lynn Laseman, DeKalb 958, and Wilbur Buell, Fond du Lac, with anothre 958. Class winners were: Expert James Patton, Valparison, Ind. 948; Sharpshooter Harry Minnick, Morton Grove 933; Marksman Mike Knox, Libertyville 916. High Lady award went to Lillian Devine, Libertyville, for her 916 score.

Don Reynolds



It was cold in the butts, too, at the Polar Bear Match.

For decades, the shooting industry has supported legislation aimed at the criminal misuse of firearms. It has also urged stronger enforcement of the laws already on the books. (NSSF)

For centuries, the Swiss Constitution has provided that every mature male be issued a gun by the army reserve. Even though these guns are kept in the home, Switzerland has virtually no armed crime. (NSSF)

The Travelers Insurance Company reports that in a five-year study of claims, hunting was 16th on the list of "dangerous" sports. In that period, there were 777 hunting claims and 4,318 from football. Hunting was out-numbered by 824 accidents in theaters, concerts and churches. (NSSF)

In 1964, an estimated 2.5 million people received instruction in recreational shooting through school, college, camp and recreation departments, according to the American Association for Health, Physical Education and Recreation. (NSSF)

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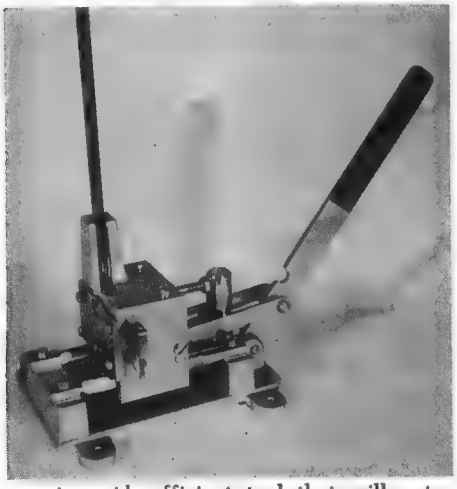

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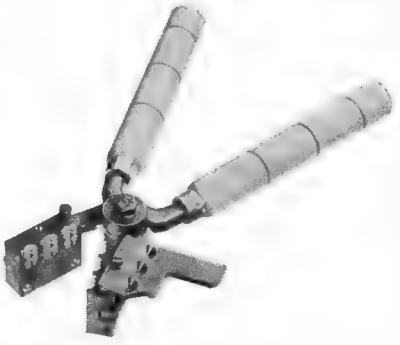

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3500 fps	32.0 grs.	32.2 grs.
3600 fps	32.6 grs.	32.8 grs.
3700 fps	33.1 grs.	33.4 grs.
3800 fps	33.7 grs.	34.0 grs.
3900 fps	34.3 grs.	34.6 grs.

50 GRAIN S/O SPIRE POINT

Muzzle Velocity	4064 Powder	4835 Powder
3300 fps	30.6 grs.	30.9 grs.
3400 fps	31.4 grs.	31.7 grs.
3500 fps	32.2 grs.	32.4 grs.
3600 fps	33.0 grs.	33.2 grs.
3700 fps	33.7 grs.	34.0 grs.
3800 fps	34.5 grs.	34.8 grs.

55 GRAIN S/O SPIRE POINT

Muzzle Velocity	4064 Powder	4895 Powder
3200 fps	29.6 grs.	30.0 grs.
3300 fps	30.4 grs.	30.8 grs.
3400 fps	31.3 grs.	31.7 grs.
3500 fps	32.1 grs.	32.5 grs.
3600 fps	32.9 grs.	33.4 grs.
3700 fps	33.7 grs.	34.2 grs.

60 GRAIN S/O SPIRE POINT

Muzzle Velocity	4064 Powder	4895 Powder
3000 fps	29.0 grs.	28.8 grs.
3100 fps	29.7 grs.	29.6 grs.
3200 fps	30.4 grs.	30.5 grs.
3300 fps	31.1 grs.	31.3 grs.
3400 fps	31.8 grs.	32.2 grs.
3500 fps	—	33.0 grs.

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gun availability cited as a cause of crime. (NSSF)

The following was issued by John Edgar Hoover, director of the Federal Bureau of Investigation, in Uniform Crime Reports—1963, page IX: " . . . Crime is a social problem and the concern of the entire community. The law enforcement effort is limited to the factors within its control. Some of the conditions which will affect the amount and type of crime that occurs from place to place are . . . Density and size of the community population and the metropolitan area of which it is a part; composition of the population with reference particularly to age, sex and race; economic status and mores of the population; relative stability of population, including commuters, seasonal and transient types; climate, including seasonal weather conditions; educational, recreational, and religious characteristics; effective strength of the police force; policies of the prosecuting officials and the courts; attitude of the public toward law enforcement problems; the administrative and investigative efficiency of the local law enforcement agency." **Nowhere in this list is**

Over the past 22 years the number of licensed hunters in the U. S. increased by nearly 80 per cent—almost twice the 43 per cent growth in population during the same period. (NSSF)

Every day more than half a million Americans perform official and private duties, which, in the final analysis, are heavily dependent on firearms and their skilled use. (NSSF)

Sportsmen are probably the only people who have asked to have their taxes raised. Hunters and the shooting industry asked for and got an 11% excise tax on the sale of sporting firearms and ammunition. Close to $300 million has been collected and used to buy wildlife land, and to finance research and conservation programs. Outdoorsmen support state fish and game agencies which are charged by law with the care of ALL wildlife. Hunters are proud that their money supports hundreds of non-hunted species. (NSSF)

THE HORNADY 168 GRAIN .30 CALIBER MATCH BULLET

by C. O. Audette

Hornady announced their 168 grain .30 caliber match bullet during the middle of the summer of 1964. I obtained a supply of these as soon as they were available and have used nearly 1000 of them. Perhaps some of my tests with these bullets and correspondence with Hornady will be of interest to our readers.

The illustration of a test group fired at 300 yards shows the high accuracy potential of these bullets. They have shown themselves capable of minute of angle accuracy in three different .308 caliber match rifles. The illustrated group is not the best one fired but it is typical of the groups that were obtained under ideal conditions. Testing was done at 300 yards prone over double sandbags with a 20 power scope. Test firing was done after sundown during the last half hour of shooting light in practically a dead calm. These are ideal conditions and there is no trouble in spotting shots in the white with a 20 power scope. The barrel was a Douglas special four groove test barrel of minimum bore and groove dimensions, and with a 12 inch twist. Cases were National Match 1959, .30-06, sized, cut off, and reamed. Powder charge was 39 grains of No. 4064. Primers were FA-70, although groups about equally as good were obtained with RWS, CCI, and Remington.

One of the gratifying things about this lot of bullets was their uniformity. Although the match rifles in which these groups were fired weigh only about 10 pounds, without the scope, it was possible to go out almost any evening under these ideal conditions and produce groups at 300 yards of under 3 inches.

I noticed that the boxes in which these bullets were packaged contained a number, apparently a lot number, the same as Hornady's hunting bullets. Correspondence with Mr. J. W. Hornady developed several interesting facts concerning their lot numbers and bullet manufacture. Hornady's lots are numbered consecutively starting the beginning of the year. For example, the lot of bullets which I have been using is 8 SO 4164. 8 is the month of manufacture, SO the style of point (Secant Ogive), 41 is the 41st lot of bullets made this year and 64 is the year.

Hornady use carbide dies and, when they are manufacturing a particular lot of bullets, try to make enough at one time to run the entire year. With some of the most popular bullets, demand is high enough so that more than one run is made per year. If they break a punch or for some reason have to interrupt a set up, when the lot goes back into production, a 2 is added as a suffix or the figure could be 3 or 4 if the lot was broken more than once.

With the lot numbering system which Hornady uses, a shooter can be assured that any box of bullets which he buys which has the same identical lot number stamped on the box was made during the same set up and with the same final bullet assembly dies.

Shooters who make their own bullets know how important this is and shooters who have made extensive tests of commercial bullets and have found considerable variation from box to box will welcome the fact that they can identify Hornady bullets by lot number.

As an illustration of what can happen to you in changing bullet lots, I saw Larry Moore shoot a 94-6V at 600 yards last July at the East Central Regional High Power Championships shot at Fort Niagara, New York. This was with the same gun and the same load with which he had won the Wimbledon at Camp Perry the previous summer. Conditions were excellent. Shooting in the same relay and only six or seven targets from Larry, I shot a possible with 15V's with my .308 match rifle. (This was only good for third place.) In talking with Larry, it developed that the only change from the ammunition he had used in the Wimbledon was that he had purchased a new lot of bullets. He said that he had a small supply of the ammunition which he had loaded and used the previous year with him. In the second 20 shot string at 600 yards, he scored 100-15V's with the original lot of bullets.

Anyone who has made jacketed bullets with a hand press, particularly if he has made them in larger calibers, is aware that variations in technique, speed of movement of the handle, lubrication, and many other factors affect the size and quality of the finished bullets. Until my correspondence with Mr. Hornady, I had assumed that this was largely due to the light hand tools used and to lack of precision in duplicating the set up from one time to another, even though the lock rings were left set in place on the dies. In view of this, the following paragraph quoted from one of his letters is most interesting.

"But, as you know, the things that affect the final diameter of a bullet are many and varied, and sometimes it just doesn't seem to make much sense. For instance, we have a quantity of jackets that have been drawn approximately a month. Using these jackets to make bullets, we get a larger diameter bullet than when we use jackets that are freshly drawn, even though the measurement of the jackets is the same. They are drawn through the same dies and with the same punches. Changing the hardness of the lead changes the diameter of the bullet as does the swaging pressure used to form it, and swaging pressure varies with the amount of lubricant. So, we get a lot of variation that is not due to a variation in the tools."

For those who are interested in working out the external ballistics, the following are the figures for sectional density and ballistic coefficient given by Hornady.

Bullet	Sectional Density	Coefficient
30 Caliber, 168 Grain Match	.253	.474
30 Caliber, 190 Grain Match	.268	.548

CONFUSING (?)

In examining the new Gun Digest book, "CARTRIDGES OF THE WORLD," I did some compartive checking of cartridge dimensions in that book with those in the Speer and Lyman handloading manuals. I found that in many cases these dimension figures in the three books did not correspond—but the differences were small. This might raise questions in some shooters' minds—but it should not be cause for any serious concern. There is a reasonable, understandable explanation for this seeming discrepancy.

In the manufacture of any mass produced article, certain tolerances of measurement (minimum to maximum) are permitted and accepted. These tolerances provide for some wear of machine tools and a minimum error of machine adjustments. For some critical items these tolerances are extremely small (in ten thousandths or less of an inch) but for other less critical items (products) the tolerances may be safely much more generous.

In the case of firearms and the cartridges to be fired in them, the cartridges produced by one manufacturer may and probably will be fired in a gun produced by another manufacturer, and vice-versa. Therefore, industry-wide tolerances for all factory manufactured guns and cartridges have been standardized, adopted and adhered to. The maximum size cartridge by any manufacturer must chamber freely in the minimum size chamber of a gun for that cartridge produced by any or all manufacturers, and the minimum size cartridge of any manufacturer be safely fired in the maximum chamber of any manufacturer.

In comparing cartridge dimensions as listed in the three books I found that the

(Continued on Page Eighteen)

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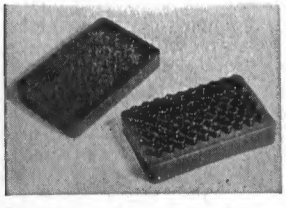

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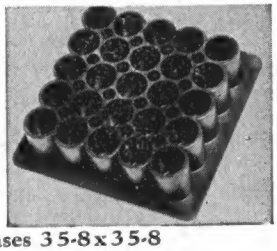

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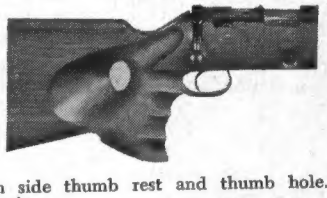

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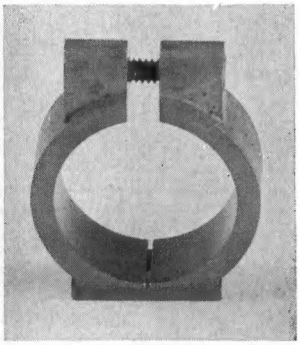

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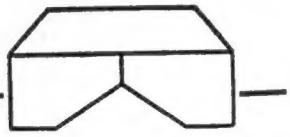

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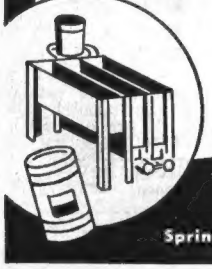

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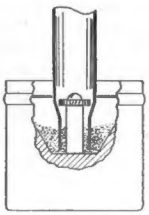

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Confusing (?)

(Continued from Page Sixteen)

dimensions listed in Cartridges of the World and the Lyman manual generally were the same, or very nearly so. Very frequently the dimensions listed in the Speer manual were slightly smaller than in the other two books.

While at this "comparing" chore I did some measuring of cartridges that I shoot. For the two cartridges of which I happened to have unfired factory rounds (.225 Win. in Super-X and .30-06 in Norma loading) both were .005" to .006" smaller in case body dimensions than were listed in the books. This leads me to suspect that the Speer book dimensions are derived from their measuring of maximum factory rounds that they had available, but this is merely my guess (How about this, Ray or Wally?).

The fired cartridges of my own that I measured were fired in bolt action rifles (some factory and some custom chambered) and only neck re-sized, therefore giving an indication of cartridge body expansion, and of chamber dimensions. This checking revealed that shoulder expansion of the case was relatively greater than at the base, just forward of the solid-head. It also indicated that some of my rifles probably have chambers of close to minimum dimensions, while others, especially my old NRA Springfield sporter, have chambers toward or near maximum dimensions. That was no surprise in the case of the old Springfield—cases fired in a number of other .30-06 chambers of bolt action rifles have chambered freely in the old Springfield but I do not recall any other bolt action .30-06 chamber that would accept a case that had been fired in my Springfield—and my rifle gives good accuracy, as compared with other .30-06 sporters. This, I think, illustrates the nice fitting of a fired and not re-sized cartridge case body to the chamber of the rifle it was fired in, and its desirability, except, perhaps, reloads for hunting when surely free-chambering of the round is important.

The foregoing applies to bolt action rifles, only. Cases of cartridges developing relatively high pressures which are fired in most semi-automatics, some (at least) pump and lever actions do expand enough upon firing to require full-length re-sizing to assure free chambering again in the chamber they were fired in. I do not fully understand why this is so, but I know it is. It has been repeatedly stated that spring-back of the rear-locked bolts of some lever action rifles causes this condition. But rear-locking of the bolt, alone, cannot be the sole cause because my Schultz & Larson action handling the .308 Win. cartridge (custom job) and the Model 153 Anschutz sporter for the .222 Rem. cartridge, that I tested last year both permit repeated reloading of cases for free chambering without any full-length resizing, and both have rear-locked bolts. Too, the Savage 99 bolt is a pretty solid looking piece, and it certainly has a pretty firm rear-locking system, but my experience has been that cases fired with full loads in these rifles require full-length resizing to fully and freely chamber again in the same rifle. Perhaps some real smart person can explain the reasons for this condition to this dumb-cluck so that he'll understand the why and wherefore for it.

P. H. T.

Twenty-eight countries sent shooting teams to the 1964 Olympic Games in Tokyo. (NSSF)

It is a federal offense to use the U. S. mail for shipment of pistols, revolvers or other concealable guns. (NSSF)

More money is poured into the American economy by shooting enthusiasts than any four spectator sports combined. (NSSF)

More than 350,000 boys and girls annually participate in National Rifle Association junior marksmanship programs. (NSSF)

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CARTRIDGES OF THE WORLD

This new, big (some 350 8"X11" pages) has been compiled by Frank C. Barnes, edited by John T. Amber, is published by the Gun Digest Company, Chicago, Ill. 60690, and is priced at $5.95.

On the cover of the book it states; "Complete and authoritative data on over 1000 rifle, pistol and shotgun cartridges, centerfire and rim fire, loads and ammunition components." I question the use of the word "complete" in that sentence but won't argue with the use of "authoritative"—so far as it goes. This is not narrow criticism—it would be true of any one book attempting to cover such a broad field as this one does. It is very obvious that it required a tremendous amount of time and work to compile all this data, which is well organized and presented. With the "leads" supplied in this book and consulting the proper books listed in the bibliography, one should be able to make a pretty thorough study of any special interests in this broad field of "cartridges."

The book has chapters on Current American Rifle Cartridges—Obsolete American Rifle Cartridges—Wildcat Cartridges (rifle and handgun)—Pistol and Revolver Cartridges Of The World—Military Rifle Cartridges Of The World—British Sporting Rifle Cartridges—European Sporting Rifle Cartridges—American Rimfire Cartridges—Shotgun Shells—Paper Cartridges For Muzzle Loaders—plus chapters on cartridge components and reloading.

The chapter on current American centerfire sporting has data on the new cartridges up to and including the .225 Winchester. Data on the .350 Remington Magnum and .22-250 Remington, which were announced after the book was compiled but before it was printed, is included in the appendix at the very back of the book. There are dimensional line drawings of all cartridges covered in this chapter. Aside from a few of the newer cartridges, the essential data in this chapter is available in the Lyman and Speer handloading manuals.

At the end of each chapter there is a table of dimensions of the cartridges covered in that chapter. A note in the appendix informs that "Dimensional data in tables are derived from micrometer measurements of sample rounds; those in the working drawings are of maximum factory case dimensions, thus may not correspond to our tables or to your sample cartridges." For examples: Dimensions for the .225 Win. cartridge on the drawing and in the table are identical. Body and neck dimensions of an unfired factory (W-W) round I have are .004 to .005 smaller than those in the book, but body and neck dimensions of a once fired round are approximately the same as those in the book. It would appear that the cartridges I have are near minimum dimensions, and that the chamber they were fired in was not much over minimum.

I have had for several years an old cartridge that was given to me which has no head stamping. It is a long, straight cartridge with a paper-patched bullet and I had suspected that it might be one of the Sharps cartridges. Doing some measuring and checking with the table for obsolete cartridges, the dimensions agreed with those for the Sharps 40-70 Straight except for overall cartridge length. According to the text for that cartridge, it was loaded with two bullet weights—330 gr. and 370 gr. The cartridge I have is evidently loaded with the 370 gr. bullet.

While this book, in itself, is not a comprehensive text book for a serious cartridge collector, it is useful for the mildly interested or plain curious person. The tables for cartridge dimensions of all listed cartridges are especially valuable and I doubt that any such complete information of this sort is available in any other one book.

There are many other useful tables in the book, many of which the experienced shooting people may already have but not in one place (book) and (as in my own case) frequently not easy to lay one's hands on when they are wanted for reference.

All in all, I consider this book a worthwhile addition to any shooter's library.

P. H. T.

PRIMERS

By Edward M. Yard
(Experimental Ballistics Associates Report)

Over two and a half years ago we placed hundreds of Federal 210 large rifle primers under environmental exposure test.

Humidity was suspect of causing primer deterioration.

PRECISION SHOOTING carried earlier reports. Seventy (70) days at 100% did cause primer failure. But this is not any unusual condition. We've had to wait longer for other results.

95% humidity is about as high as we see it anywhere in North America. It never averages that for any period of time. Yet that is what we subjected these Federal primers to.

They functioned normally after 30 months exposure to such continuous dampness that even the cardboard boxes came apart.

This particular test has been terminated because the primers so exposed have now been used up in periodic tests. Since those subjected to the 95% humidity survived this long a time, we are not pursuing lower percent exposures any longer.

The results are simply that while 100% humidity is too much for primers as a continuous environment, even a rather improbable condition of 95% for 30 months does not impair them enough to cause serious malfunction. Within our limited sample of 15 surviving caps, all fired in a Springfield '03A3 rifle. Five others previously tested by drop weight required 20% greater drop to fire, but so small a number tested indicates nothing positive.

We must for now conclude that any normal household exposure to humidity likely to occur within the U. S. A. won't harm primers within a few years time.

Noting that 70 days of 100% humidity did cause total failure of primers, it will be wise to avoid needless exposure to steamy conditions. Beyond this nothing more is needed.

NO ONE is likely to heat primers. However any exposure to temperatures above 180° F is not good. We have heated them to 350° (dangerous, likely to cook off) and have found lower sensitivity and very erratic ignition as indicated by chronograph velocity of loads.

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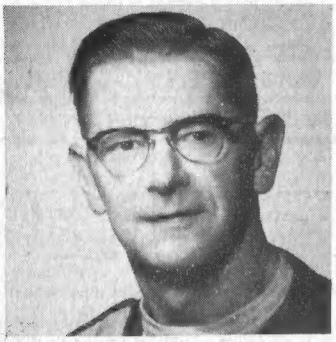
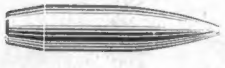
Ask L. G. Rackel, 1964 Wimbledon Winner,* about Sierra Bullets...



"Your **Matchkings** were very good to me each time I squeezed the trigger of the .300 H & H magnum rifle in the 1964 National Match 1000 yd. Wimbledon Cup and Leech Cup competitions... A possible 100 with 13 V's in the Wimbledon got me into that shoot-off. In the first shoot-off I compiled a score of 50 and 9 V's. The shot-by-shot shoot-off lasted for 9 rounds in which I took 8 V's and one five. This adds up to **79 Matchkings fired for record at 1000 yards, all of which were in the bulls eye. Of this total 59 went through the V-ring.**"

*

This world famous 1000 yd. contest has been won by riflemen using Sierra Bullets in the last 11 out of 12 matches.



Mr. Rackel used Sierra's 190 gr. Match-king H.P. (one of four 30 cal. Matchking Bullets).

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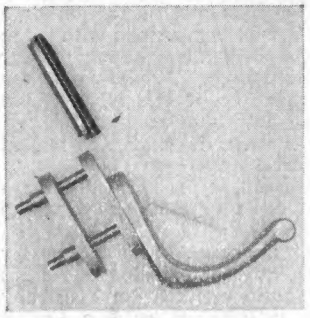

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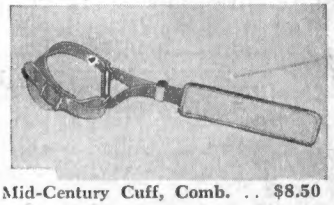

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